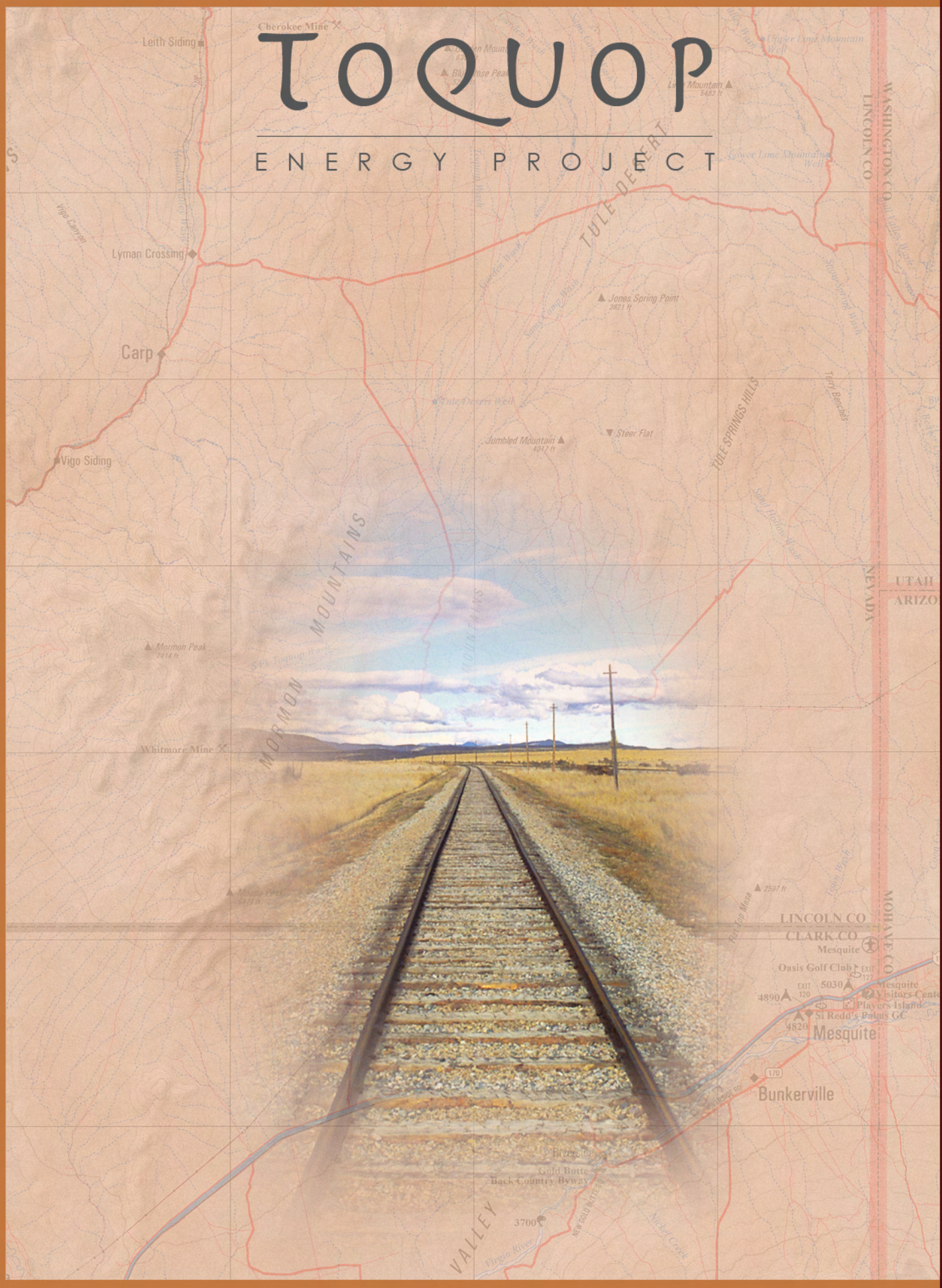
TOQUOP

ENERGY PROJECT



CHAPTER 4.0 - ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter characterizes the potential impacts on the environment that would result from the implementation of the alternatives described in Chapter 2. The analyses of predicted direct and indirect impacts on each resource or resource use are discussed below, and a brief discussion of methods used in the analysis is provided in each section. As needed, mitigation measures are identified to reduce, avoid, or compensate potential impacts. At the end of each resource discussion, a summary of the residual impacts identifies expected impacts that would occur after mitigation is applied and provides a comparison of alternatives.

Cumulative impacts are described for all resources and resource uses in Section 4.18. The final sections of the chapter summarize unavoidable adverse impacts, short-term uses of the environment, long-term productivity, the irreversible and irretrievable commitments of resources, and energy requirements and conservation potential.

Definitions of "significant," "minimal," and "negligible" as used with respect to impacts, are defined in the glossary, unless otherwise qualified (e.g., Climate and Air Quality).

4.2 LANDS

4.2.1 Methods

The lands impact analysis evaluated the potential effects caused by the construction, maintenance, and operation of the Proposed Action Alternative and the No-Action Alternative on land use and Bureau of Land Management (BLM) land and realty actions in the project area. The analysis is based on a review of existing and planned land uses to determine direct, indirect, and cumulative impacts locally and regionally. An adverse impact on lands would occur if a proposed project would be incompatible with existing or planned land uses, or a land use would be displaced or otherwise affected (e.g., because of changes in access to the area) by the project.

4.2.2 No-Action Alternative

4.2.2.1 Impacts

The construction of the power plant would insert an industrial use into the area, although no other incompatible, developed land uses (such as residences) are present. The power plant's co-location with existing transmission lines and a natural-gas pipeline takes advantage of the access to those facilities, and additional linear facilities would not need to be built to transmit the power.

Lincoln County has planned future residential development on the parcels that were transferred to private ownership under the Lincoln County Land Act. However, this area is approximately 9 miles from the power plant site, and separated visually by topographical features (see Visual Resources, Section 4.7).

The transference of public land to private ownership would result in a net loss of acreage available for public use. Grazing and recreation would continue in the vicinity of the power plant site (these issues are discussed in Section 4.3 and 4.4 respectively). The construction of the power plant would not impact the ability to develop existing mining claims in the area.

4.2.2.2 Mitigation

Any temporary disturbance to rangelands as a result of construction of project facilities would be restored to its prior conditions.

4.2.3 Proposed Action Alternative

4.2.3.1 Impacts

Impacts would be similar to the No-Action Alternative since the power plant site would be in the same location. The addition of the rail line would result in the development of acreage beyond what is proposed for the No-Action Alternative.

4.2.3.2 Mitigation

Any temporary disturbance to rangelands as a result of construction of project facilities would be restored to its prior conditions.

4.2.4 Summary of Impacts

No impacts are expected to occur on land use from the alternatives.

4.3 LIVESTOCK GRAZING AND RANGELANDS

4.3.1 Methods

To analyze impacts on grazing and rangeland that the No-Action Alternative and Proposed Action Alternative might have on the grazing allotments in the project area, the BLM Ely Field Office, Resource Management Plan (RMP)/Environmental Impact Statement (EIS) was used to identify existing grazing allotments, authorized animal unit months (AUMs), and season of use. An impact on grazing would occur if grazing were displaced from an area, AUMs were reduced, or range improvements and forage were affected.

4.3.2 No-Action Alternative

4.3.2.1 Impacts

The location of the gas-fired plant lies within the Gourd Spring grazing allotment. As noted in Chapter 3, livestock grazing was excluded from the power plant site as a result of the construction of the boundary fence meant to protect the Mormon Mesa Area of Critical Environmental Concern (ACEC). No AUMs would be lost by the construction of the power plant. Ancillary facilities such as the well sites, monitoring well, and storage tanks, however, would remove about 12 acres from use for the life of the project. Overall livestock management would not be affected, however, due to the spacing of the facilities and the small number of acres involved.

The permitted water pipeline would originate in the Gourd Spring allotment, pass through Summit Spring, and terminate at the Garden Springs allotment. Construction activities along the water pipeline could disturb up to 90 acres of rangeland that is currently managed for livestock use, with the effect of displacing forage temporarily. Vegetation within the temporary right-of-way would be reclaimed after construction.

Construction of the pipeline also could affect range improvements, such as fencing.

4.3.2.2 Mitigation

If construction activities cause damage to existing range improvements, the range improvements would be repaired using material that meets or exceeds the quality of the existing improvement. If damage occurs, the BLM and livestock operator would be notified immediately. If damage occurs during active livestock grazing, repairs would be made within 24 hours.

4.3.3 Proposed Action Alternative

4.3.3.1 Impacts

Impacts would be the same as that in the No-Action Alternative, except with respect to the rail line. Construction activities along the right-of-way of the proposed rail line would temporarily reduce available forage in those areas. After construction, grazing would be displaced on up to 356 acres within the permanent right-of-way for the rail line. Four grazing allotments would be affected—Gourd Spring (153.9 acres), Garden Springs (23.3 acres), White Rock (54.5 acres), and Henrie Complex (124.6 acres). The number of acres affected within each allotment represents a small fraction of each total allotment. The construction of the rail line would displace existing fences in four locations (Map 3-1).

4.3.3.2 Mitigation

Mitigation would be the same as the No-Action Alternative. In addition, where required, tortoise fencing would be approximately 18 to 24 inches high, consisting of welded mesh attached to small stakes so cattle should be able to move over it.

4.3.4 Summary of Impacts

Livestock grazing would be displaced from some areas under both alternatives. Under the No-Action Alternative, a total of 12 acres would be displaced within allotments with active AUMs. Under the Proposed Action Alternative, an additional 356 acres would be displaced as a result of the construction of the rail line. These acre totals represent a small fraction of the overall allotments (which range in size from 355,024 acres to over 1.8 million acres). No effect on authorized AUMs would be expected.

4.4 RECREATION AND ACCESS

4.4.1 Methods

The environmental consequences on recreation resources and access were identified and measured by comparing the existing conditions described in Chapter 3 to the conditions that would be expected after implementation of the action. The analysis evaluated impacts on the transportation network in the project area based on assumptions regarding project access requirements during construction, operation, and long-term maintenance identified in the 2003 EIS (No-Action Alternative) and Appendix A (Proposed Action Alternative). Impact descriptions include the type of recreational activity affected, sensitivity of the landscape, whether the impact is direct or indirect, and duration of impact. Most impacts on recreation would be related to the disturbance of or lack of access to recreation areas.

4.4.2 No-Action Alternative

4.4.2.1 Impacts

Transferring the 640-acre parcel from public to private ownership (Toquop Energy Company, LLC [Toquop Energy]) would preclude the continuation of existing public access opportunities on the fenced portion of the parcel. However, as noted in the 2003 EIS, recreational use does not require direct use of the power plant site. Recreational use is mainly casual, including wildflower and bird viewing in the spring, primitive camping, and off-highway-vehicle (OHV) driving for pleasure. Careful groundwater well siting would minimize potential future conflicts between OHV users and the aboveground production wells. Some hunting (primarily to the west in the foothills of the East Mormon Mountains) also occurs in the area, and impacts on hunting are not anticipated.

Implementation of the action approved in the 2003 EIS would not create additional demand for recreational opportunities in the project area, but it would provide improved access for individuals who wish to pursue recreational opportunities nearby (BLM 2003a). During the early portion of the construction phase, the activity to widen, straighten, and level Halfway Wash Road would temporarily

and intermittently disrupt recreational access. During construction of the power plant or the water pipeline, the presence of construction vehicles also would temporarily and intermittently disrupt recreational access.

As the power plant is constructed, a temporary increase in average daily traffic would occur on Interstate 15 (I-15) near the East Mesa Interchange. Travel flow at the East Mesa Interchange would be heaviest at the start and end of work shifts, particularly between 3:00 and 4:00 p.m., when work shift changes coincide with existing peak traffic levels on I-15. To improve traffic flow at the one-lane underpass, mitigation measures are recommended.

Increases in nighttime traffic during construction would not be expected to impact existing conditions, since existing traffic levels are already low at that time. During the operation of the plant (25 plant employees), the number of trips on the access road and I-15 would be reduced from traffic levels during construction (500 construction employees). No impacts on roadway condition would be expected, because I-15 was designed to handle interstate traffic, and the access road to the power plant site would be improved to accommodate equipment deliveries and other traffic.

4.4.2.2 Mitigation

Mitigation would not be required for recreational resources. In the 2003 EIS, several transportation management measures were identified as standard operating procedures that would be implemented as part of the No-Action Alternative, including the following:

- Providing a traffic flag person at both ends of the one-lane underpass (construction phase only) to direct traffic during periods of heavy traffic flow.
- Scheduling project vehicles during peak construction periods so that they arrive at the one-lane underpass at intervals considered suitable to provide smooth traffic-flow patterns.
- Scheduling materials/equipment vehicle deliveries so that they do not arrive at the one-lane underpass during the beginning or end of a work shift.

Additional mitigation measures that are related to traffic and transportation are included in the sections addressing Air Quality and Noise.

4.4.3 Proposed Action Alternative

4.4.3.1 Impacts

Impacts would be the same as the No-Action Alternative with regard to the power plant site. The 31-mile-long rail line would traverse the Tule Desert, where recreational uses historically have included OHV use and hunting. OHV use has increased in recent years. Recreational users traverse the area via several existing roads. Primarily, hikers and horse packers use the Clover Mountains north of the project area (BLM 2006) where the terrain is too rugged for OHV use. In addition to recreational users, other users of Lyman Crossing Road include primarily ranching and grazing permittees.

In approximately 10 locations, the proposed rail line would cross primitive/unimproved roads still associated with grazing and ranching and now also used by OHVs. During the construction phase, the rail line construction activity would temporarily and intermittently disrupt recreational access in these locations.

A popular destination for OHV users in the project area is the Toquop Wash area. The Proposed Action Alternative would have little to no effect on the access to Toquop Wash as the approach to this area is from I-15, exit 100, and along Halfway Wash.

There is little potential for the proposed rail line to affect other recreational opportunities in the area such as camping, hiking, and nature study. Most camping and hiking in the project area takes place to the west of the rail line in the Mormon Mountains Wilderness.

Most upland and big-game hunting near the project area occurs in the East Mormon Mountains and Meadow Valley Wash. Fur trapping and varmint hunting would likely occur throughout the project area, but at an unknown level. The permitted access road would provide improved access to the East Mormon Mountains and potential for increased recreational use.

There would be no impacts on developed recreation sites.

4.4.3.2 Mitigation

Mitigation would be the same as the No-Action Alternative.

4.4.4 Summary of Impacts

Under the No-Action or Proposed Action alternatives, there would be minor displacement of dispersed recreational uses that would not be expected to impact overall recreational use in the area.

Potential impacts on traffic patterns would be temporary and would be mitigated through traffic management, such as road closures/detours, temporary signage, and speed-limit adjustments.

4.5 WILDERNESS AND SPECIAL MANAGEMENT AREAS

4.5.1 Methods

This analysis addresses the potential impacts on Wildernesses and ACECs from the No-Action and Proposed Action alternatives. The environmental consequences are identified and measured by comparing the existing conditions described in Chapter 3 to the conditions that would be expected after implementation of the action. The analysis is based on review of the management objectives for existing Wilderness and special management areas in the project area. An impact on wilderness and other special management areas would occur if the construction and implementation of a project would affect the achievement of management objectives in specially designated areas.

4.5.2 No-Action Alternative

4.5.2.1 Impacts

There would be no direct impacts on designated wilderness areas because all project facilities would be located outside of wilderness areas. The access road is an allowable use within the Mormon Mesa ACEC.

The Mormon Mesa ACEC is managed as a right-of-way (ROW) avoidance area in both Lincoln and Clark counties. As an upgrade to an existing road, the proposed upgrades would meet ACEC requirements in Lincoln County according to stipulations contained in the Caliente Management Framework Plan that call for the use of existing roads for construction in the ACECs and the avoidance of areas outside of corridors within ACECs (BLM 2000). The Mormon Mesa ACEC within Clark County would be subject to the following management stipulations: “Require reclamation of temporary roads. Authorize new roads in response to specific Proposed Action Alternatives where no feasible alternative exists. Ensure access to private property” (BLM 2003a). Therefore, the improvement of the existing graveled road to the proposed power plant site would be in conformance with the Las Vegas RMP.

The improved permitted access road would result in easier vehicular access to points within 3 miles of the Mormon Mountains Wilderness. This could lead to a small increase in the number of Wilderness visitors.

4.5.2.2 Mitigation

Mitigation would not be required.

4.5.3 Proposed Action Alternative

4.5.3.1 Impacts

Impacts would be the same as the No-Action Alternative since the power plant site and rail line would not directly impact specially designated areas and the access road would be the same as proposed in the No-Action Alternative.

4.5.3.2 Mitigation

Mitigation would not be required.

4.5.4 Summary of Impacts

The implementation of the No-Action Alternative or the Proposed Action Alternative would not impact the achievement of management objectives within specially designated areas. Although the access road would cross the Mormon Mesa ACEC, this is allowed use.

4.6 VISUAL RESOURCES

4.6.1 Methods

Impacts on visual resources resulting from the No-Action and Proposed Action alternatives would vary depending upon the degree of perceived change to the visual resource and the viewers' response to that change. Visual contrasts typically result from (1) landform modifications that are necessary for construction of the proposed action, (2) removal of vegetation or soil to construct project facilities and maintain right-of-way and clearance zones, and (3) introduction of new structures or lighting to the landscape. Three distance zones were considered to describe visual impacts—foreground (0 to 0.5 mile), middleground (0.5 mile to 3 miles) and background (beyond 3 miles).

4.6.2 No-Action Alternative

4.6.2.1 Impacts

Construction of project facilities would introduce structures that would have potential visual impacts in the project area as described in the 2003 EIS. The power plant may be visible from the ridges in the Mormon Mountains Wilderness, about 5.5 miles away. In addition, nighttime lighting for operational safety and security would create a new source of light in an area of very little night lighting. During construction, temporary impacts on visual resources would result from (1) generation of fugitive-dust, (2) presence of construction equipment, and (3) increased light during possible nighttime construction.

Visual impacts resulting from construction and presence of the water pipeline would be limited to the construction phase. The pipeline would be buried and areas of ground disturbance would be restored.

Implementation of the No-Action Alternative would be consistent with BLM Visual Resources Management (VRM) Class IV designation, which applies to most of the project area. The permitted access road that lies within Clark County would be consistent with BLM objectives for the VRM Class III designation, as upgrading the frontage and dirt roads would not degrade the existing view from 1-15 and would not attract or focus the attention of the casual viewer away from the mountains in the distance (BLM 2003a).

4.6.2.2 Mitigation

To mitigate the contrast between project facilities to the existing landscape and to reduce the effect of lighting, the 2003 EIS identified the following measures as standard operating procedures that would be implemented as part of the No-Action Alternative:

- All structures, stacks, buildings, and tanks would be constructed of materials that would restrict glare and would be finished with flat tones intended to blend with the surrounding environment. The project applicant would consult with Lincoln County and BLM regarding the final selection of colors for the features of the property.
- All fencing would be constructed of non-reflective materials and would be treated or painted to blend with the surrounding environment.
- Signs at the plant site would be constructed of non-glare materials and would be painted using unobtrusive colors.
- Lighting would be limited to areas required for safety and security and would be shielded and directed downward to the greatest extent possible.
- Lighting would be directed and shielded to reduce light scatter and glare. Highly directional, high-pressure sodium-vapor fixtures (or other fixtures that meet the criteria specified) would be used where practicable.
- Switches would be used as appropriate to allow lighting to be used only when needed.
- The transmission structures would be finished with flat, neutral gray tones that would relate to the colors of the structures in the existing transmission corridors and that would blend with the surrounding environment. Non-specular conductors and non-reflective and non-refractive insulators would be used to reduce conductor and insulator visibility.

4.6.3 Proposed Action Alternative

4.6.3.1 Impacts

Impacts would similar to those identified for the No-Action Alternative, but would differ due to those impacts associated with rail line and power plant facilities.

The plant would be visible in the background from I-15, 10 miles south of the site. Landform screening effectively limits these views to intermittent segments along I-15; however, because of the interstate's distance from the proposed power plant, individual power-plant features would not likely be discernible during daytime viewing. Plant features may be more apparent at night due to nighttime lighting. The proposed plant would increase the amount of light emitted from the project site. Appendix B contains photographs of existing conditions, as well as simulations of the proposed plant as taken from a key observation point.

The proposed power plant would be visible in the background from peaks in the Mormon Mountains Wilderness; however, views would be limited (refer to Map 3-5). The East Mormon Mountains provide an effective screen for most of the wilderness.

Toquop Township is located approximately 6 miles southeast of the power plant site and has the potential for future residential development. Flat Top Mesa acts as a screen to approximately two-thirds of Toquop Township; however, the plant features may be seen in the background from atop the Mesa.

Construction and use of the proposed rail line would introduce structural contrast to the natural landscape of the Tule Desert and Meadow Valley Wash. The proposed rail line would be visible from the northeastern portion of the Mormon Mountains Wilderness, as well as in the southern tip of the Clover Mountains Wilderness (refer to Map 3-6). The portion of the Mormon Mountains Wilderness closest to Toquop Gap would be subject to middle-ground views, where the rail line would be located approximately 1 mile from the wilderness boundary. Other locations in the Mormon Mountains Wilderness would have views of the rail, but the feature would be in the background and not likely obvious due to the low elevation of the rail and the height of surrounding vegetation. When construction is complete, the desert vegetation would be restored in the temporary construction right-of-way, leaving no more than 356 acres of permanent disturbance.

Foreground views of the rail and its construction would be visible from the southernmost tip of the Clover Mountains Wilderness. Views would be impacted by landform modifications needed to accommodate the rail line, as construction would involve cutting into the eastern hillside of the Upper Meadow Valley Wash. Previous modifications to the Upper Valley Meadow Wash include the existing Union Pacific Railroad (UPRR). Appendix B contains photographs of existing conditions, as well as a simulation of the proposed rail line taken from a key observation point in the Upper Valley Meadow Wash, to illustrate these landform modifications.

There are two existing residences near Lyman Crossing. The proposed rail line is situated in a hillside northeast of the homes. Both homes are located on the eastern side of Meadow Valley Wash. Existing landforms screen the rail line from viewers. The residences currently have direct views of the existing UPRR.

Potential impacts on visual resources would occur as a result of landscape modifications within the South Fork tributary corridor and Toquop Gap. These impacts would be the result of the rail line placement, resulting in a landform contrast with the surrounding natural setting.

Impacts on haze conditions are negligible and impacts on visibility related to air emissions are described under Section 4.7, Air Quality.

Implementation of the Proposed Action Alternative (coal-fired plant and rail line) would meet the objectives of the BLM VRM Classes III and IV designations of that land.

4.6.3.2 Mitigation

Mitigation measures outlined in the No-Action Alternative would be applied to the Proposed Action Alternative, which are in accordance with the BLM's best management practices for visual resource management. (For detailed information about the BLM's best management practices, see http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html).

4.6.4 Summary of Impacts

Under both alternatives, the introduction of new structures would create contrast with the existing natural environment.

4.7 CLIMATE AND AIR QUALITY

4.7.1 Methods

This section presents a discussion of the potential impacts associated with the No-Action Alternative and the Proposed Action Alternative and their potential effects on air quality in the project area. In most instances, impacts are categorized and described in general terms without reference to facility type or any site-specific resources. It is also important to note that the information presented here is simply a

summary. Additional technical information is provided within the technical support document located in Appendix D.

Estimated emissions of criteria pollutants and hazardous air pollutants from the power plant under the Proposed Action Alternative were extracted from the air-quality permit application prepared by ENSR Corporation (ENSR) for Toquop Energy, which was submitted to the Nevada Division of Environmental Protection (NDEP), pursuant to the Federal Prevention of Significant Deterioration (PSD) program. In addition, ENSR performed dispersion modeling to evaluate air-quality impacts of the plant emissions on local and regional air quality. Construction and vehicle emissions not covered by ENSR's air application were calculated by URS Corporation.

For purposes of the air-quality impact analysis, the following qualitative terms were used to describe the potential impact levels in terms of the relationship to established standards for air quality:

- **Major**. Ambient air quality could be permanently degraded, as a direct result of implementing the proposed project, to the extent that re-designation of the project area by the U.S. Environmental Protection Agency (EPA), with respect to one or more of the National Ambient Air Quality Standards (NAAQS) pollutants, from "attainment" or "unclassified" to "non-attainment" is possible. An air-quality degradation increment, applicable to attainment and unclassified areas under the Federal PSD program regulations, could be consistently exceeded; regional haze could be consistently worsened by 5 percent visibility extinction or more; or cumulative regional emissions might increase, causing one or more of the above results.
- **Moderate**. Discernible degradation of regional air quality that does not consistently exceed applicable NAAQS, PSD increments, or Federal/state visibility protection standards.
- **Minor**. Insignificant degradation of regional or local ambient air quality at levels less than 20 percent of applicable standards; temporary or transient emissions occurring within a defined time period.
- **Negligible**. Indiscernible or immeasurable degradation of regional or local ambient air quality or visibility.
- **None**. No air pollutant emissions occur.

ENSR calculated mercury (Hg) emissions from the main stack and performed dispersion modeling to predict maximum deposition rates for both vaporous and particulate Hg within 40 kilometers (km) of the proposed plant site. The deposition rates were modeled using the same meteorological dataset that was used for the Class II American Meteorological Society/EPA Regulatory Model (AERMOD) modeling in support of the PSD permit application. This dataset consisted of one full year of data from an onsite measurement tower. For deposition modeling, this processed meteorological dataset was supplemented with precipitation data from Overton, Nevada, the nearest and most representative station, and with relative humidity and station pressure data from St. George, Utah.

The receptors used for the modeling analysis consisted of a square grid extending 40 km in all directions from nearby the Toquop Energy Project main stack at a 1-km resolution. The terrain elevations for these receptors were developed using AERMAP, AERMOD's terrain processor. The stack parameters and emission rates used for this analysis were consistent with those used in the PSD application's supporting modeling. This source has the following release characteristics: Height: 222.5 meters; Diameter: 7.44 feet; Velocity: 19.81 meters/second; and Temperature: 327.59 Kelvin.

4.7.2 No-Action Alternative

4.7.2.1 Impacts

Dispersion modeling was performed to predict the maximum nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter with aerodynamic diameter less than 10 microns (PM_{10}), and sulfur dioxide (SO_2) concentrations as a result of air emissions under the No-Action Alternative. Table 4-1 presents the predicted impacts from the No-Action Alternative and compares them to the Class II increment and NAAQS. None of the maximum predicted impacts exceeded the PSD increments or the NAAQS.

Table 4-1
Estimated Air-Quality Impacts during Plant Operations and Comparison to PSD Increments and NAAQS

Pollutant	Averaging Period	Maximum Predicted Impacts ($\mu g/m^3$)[1]	SIL ($\mu g/m^3$)	Percent of SIL	PSD Class II Increment ($\mu g/m^3$)	Percent of Incr.	NAAQS ($\mu g/m^3$)	Percent of Ambient Standard
Nitrogen dioxide (NO_2)[2]	Annual	12.6	1	1,260	25	50	100	13
Sulfur dioxide (SO_2)	Annual	0.9	1	90	20	5	80	1
	24-hour	4.5	5	90	91	5	365	1
	3-hour	21.8	25	87	512	4	1,300	2
PM_{10} [3]	Annual	2.1	1	210	17	12	Revoked[4]	NA
	24-hour	9.4	5	188	30	31	150	6
Carbon monoxide (CO)	8-hour	51.7	500	10	NA	NA	10,000	1
	1-hour	406.6	2,000	20	NA	NA	40,000	1

SOURCE: Bureau of Land Management 2003b

NOTES: $\mu g/m^3$ = micrograms per cubic meter
SIL = significant impact level
PSD = Prevention of Significant Deterioration
NAAQS = National Ambient Air Quality Standards
NA = not applicable

1 Other than PM_{10} these impacts do not include any background concentrations.

2 Nitrogen dioxide (NO_2) is one type of nitrogen oxide(NO_x); NO_x is a general term for all oxides of nitrogen.

3 Maximum predicted particulate matter with aerodynamic diameter less than 10 microns (PM_{10}) impacts include background of 9 $\mu g/m^3$ (annual average) and 10.2 $\mu g/m^3$ (24-hour average).

4 Due to lack of evidence linking health problems to long-term exposure to PM_{10}, the U.S. Environmental Protection Agency has revoked the annual PM_{10} standard effective December 17, 2006.

4.7.2.2 Mitigation

Several fugitive-dust mitigation measures (excerpted from Appendix B of the 2003 EIS) are described in Appendix D.

4.7.3 Proposed Action Alternative

This section addresses the predicted or anticipated impacts on local and regional air quality attributable to the Proposed Action Alternative, including the following sources:

- Air pollution emissions from construction activities, including fugitive dust from earthmoving activities (plant and rail line construction) and tailpipe emissions from construction vehicles and equipment (Appendix D, Section 4.1).
- Particulate emissions from materials handling [including coal, ash, gypsum, lime, powdered activated carbon, and coal combustible products (CCP)] and due to vehicular traffic on roads during operations Appendix D, Section 4.2).

- Emissions of criteria air pollutants from the power plant operations, which includes the combustion of coal; the operation of air-pollution-control equipment; the combustion of fuel oil in the auxiliary boilers, fire-water pump engine, emergency generator, and onsite locomotive engines; working and evaporative losses from fuel- and oil-storage tanks; and emissions from employee and vendor vehicles (Appendix D, Section 4.3).

4.7.3.1 Predicted Ambient Air Quality Impacts

Table 4-2 summarizes the predicted ambient-air-quality impacts of the power plant, based on AERMOD modeling results. The maximum predicted ambient concentrations for SO_2 (24-hour and annual) and CO (1-hour and 8-hour) are below the Significant Impact Level (SIL) for those pollutants. In accordance with the EPA document *Guideline on Air Quality Models* (EPA 1999), no further analysis of these pollutants (i.e., Class I impacts and increment consumption), for the specified averaging times, is required under the PSD regulations. The maximum predicted ambient concentrations for NO_x (annual), SO_2 (3-hour), and PM_{10} (24-hour and annual) are above the corresponding SIL. There are no promulgated SILs for lead (Pb). None of the predicted maximum ambient-pollutant concentrations exceeded the corresponding PSD Class II degradation increment or the NAAQS.

Table 4-2
Maximum Predicted Air Quality Impacts from the Proposed Action Alternative

Pollutant	Averaging Period	Maximum Modeled Conc. ($\mu g/m^3$)	Distance km (mi)	Bearing (Deg.)	SIL ($\mu g/m^3$)	Percent of SIL	PSD Class II Increment ($\mu g/m^3$)	Percent of Incr.	NAAQS ($\mu g/m^3$)	Percent of Ambient Standard
Nitrogen dioxide (NO_2)	Annual	4.758	0.4 mi (0.6 km)	193	1	476	25	19	100	5
Sulfur dioxide (SO_2)	3-hour	30.505	3.5 mi (5.7 km)	279	25	122	512	6	1,300	2
	24-hour	3.193	3.5 mi (5.7 km)	279	5	64	91	4	365	1
	Annual	0.413	6.0 mi (9.6 km)	19	1	41	20	2	80	1
PM_{10}	24-hour	14.450	0.6 mi (1.0 km)	80	5	289	30	48	150	10
	Annual	3.722	0.4 mi (0.6 km)	193	1	372	17	22	Revoked	NA
Carbon monoxide (CO)	1-hour	107.480	3.5 mi (5.7 km)	279	2,000	5	NA	NA	40,000	0.3
	8-hour	28.951	0.4 mi (0.6 km)	200	500	6	NA	NA	10,000	0.3
Lead (Pb)	Quarterly	0.011	3.5 mi (5.7 km)	279	NA	NA	NA	NA	1.5	1

SOURCE: ENSR Corporation 2007a
NOTES: $\mu g/m^3$ = micrograms per cubic meter
Conc. = concentration
mi = mile
km = kilometer
Deg. = degree
SIL = significant impact level
PSD = Prevention of Significant Deterioration
Incr. = increment
NAAQS = National Ambient Air Quality Standards
PM_{10} = particulate matter with aerodynamic diameter less than 10 microns
NA = not applicable
Nitrogen dioxide (NO_2) is one type of nitrogen oxide (NO_x); NO_x is a general term for all oxides of nitrogen.

Mercury emissions are estimated to total approximately 0.098 tons per year. This figure was calculated based on maximum expected mercury concentration in coal of 0.15 parts per million (ppm) and the assumption that 80 percent control of mercury would be achieved by the proposed project, as further detailed in Appendix 5 of the PSD application (ENSR 2006a). The 0.15 ppm mercury concentration in the coal was provided by a fuel data specification sheet from Utility Engineering. The 0.15 ppm concentration is the maximum expected value over the range of fuels. The mercury value of the coal was multiplied by the maximum annual boiler-firing rate, assuming 6,048 million British thermal units per hour 8,760 hours per year, with a coal heating value of 8,078 British thermal units per pound (the lower heating value of the coal, as identified on the Utility Engineering fuel data specification sheet) and an 80-percent control efficiency from the control equipment (ENSR 2007b). These values provide a conservative estimate of the mercury emission rate, since they account for maximum boiler operation and no boiler downtime.

The mercury deposition modeling analysis utilized the AERMOD model, which has specialized routines to simulate vaporous and particulate deposition of primary pollutants. AERMOD has commonly been applied in conducting risk assessments for combustion sources. Mercury is present in both vaporous and particulate form, for which the deposition mechanisms vary. A fraction of the mercury would be emitted in particulate form because it condenses on the surface of pre-existing particulates in the flue gas, and the balance is emitted as vapor. AERMOD was run twice to estimate the contribution to the total mercury deposition from each form. For the analysis, it was assumed that, of the total mercury emitted from the stack, 80 percent would be in vaporous form and 20 percent would adhere to particulates, which is recommended by the EPA Office of Solid Waste as a conservative approach (Office of Solid Waste 1998).

AERMOD was run to generate annual average deposition rates for mercury in both vaporous and particulate form at each modeled receptor. These deposition rates were then summed to estimate the total mercury deposition at each receptor in units of grams per square meter per year (grams/m^2/yr). Modeled mercury deposition ranged from $1.0E^{-6}$ to $1.2E^{-5}$ g/m^2/yr within the 40-km radius. The highest modeled deposition rate occurred approximately 3.25 miles (5.2 kilometers) northeast of the proposed power plant (ENSR 2007c). This information is evaluated further in Section 4.12 in terms of potential effects on biological resources.

4.7.3.2 Mitigation

Construction Emissions

Refer to Section 4.7.2.2 of this document, as the mitigation measures for the Proposed Action Alternative would be the same as those for the No-Action Alternative.

Plant Operations

The air pollution controls proposed for the power plant include low-NO_x burners, selective catalytic reduction (SCR), a baghouse, and wet scrubbers. Refer to Appendix D for further technical details.

4.7.4 Summary of Impacts

During construction, both the No-Action and Proposed Action alternatives would result in temporary and localized increases in ambient air concentrations of NO_x, CO, SO_2, PM_{10}, particulate matter with aerodynamic diameter less than 2.5 microns ($PM_{2.5}$), and volatile organic compounds (VOCs) from exhaust emissions of worker vehicles, heavy construction equipment, diesel generators and other machinery and tools. In addition, fugitive-dust emissions would result from vehicular travel on unpaved ground surfaces and from excavation and earthmoving activity. The No-Action Alternative is associated

with fewer of these types of impacts, because it would not require construction of the rail line included under the Proposed Action Alternative. These impacts would be mitigated through measures such as wet suppression, use of gravel on unpaved surfaces, and travel and speed restrictions.

The operation of the plant under either alternative would cause criteria pollutant emissions. The Proposed Action Alternative would result in higher emissions of SO_2, PM_{10}, NO_x, CO, and Pb during plant operations. Under either alternative, none of the maximum predicted impacts from plant emissions would exceed the PSD Class II increments (the maximum allowable ambient air quality deterioration allowed under the PSD program) or the NAAQS (the pollutant concentrations below which no adverse human health or environmental impacts would occur).

Table 4-3 compares the maximum emissions due to construction activities from the No-Action and Proposed Action alternatives. The emissions of CO, NO_x, and PM_{10} would be greater for the Proposed Action Alternative due to construction of the rail line. The majority of the PM_{10} emissions (approximately 99 percent) would be due to earthmoving activities. Since these emissions would occur at ground level, it is unlikely that the emissions would be transported more than a few kilometers, except on unusually windy days. In addition, all of these emissions would be temporary, spatially distributed over a large area, and spread out over construction schedules ranging from 6 to 50 months. The mitigation measures would be expected to reduce these impacts.

Table 4-3
Comparison of Maximum Pollutant Emissions for the Duration of Construction Activities

Criteria Pollutant	No-Action Alternative[1] (1,100-MW Plant) (tons)	Proposed Action Alternative[2] (750-MW Plant) (tons)
Carbon monoxide (CO)	24.7	486.2
Nitrogen oxides (NO_x)	115.7	1,657.2
Sulfur dioxide (SO_2)	17.8	1.5
PM_{10}	399.3	1,795.9

SOURCES: [1] URS calculations (based on Bureau of Land Management 2003a)
[2] ENSR Corporation 2006a
NOTES: Construction activities and duration of project elements vary.
MW = megawatt
PM_{10} = particulate matter less than 10 microns in diameter

Table 4-4 compares the maximum emissions due to plant operations from the No-Action and Proposed Action alternatives. Consequently, the total annual emissions of VOC, CO, NO_x, SO_2, and PM_{10} for the No-Action Alternative would be less than estimated for the Proposed Action Alternative. The Proposed Action Alternative would have lower efficiency and higher emissions per unit of power produced.

Table 4-4
Comparison of Maximum Pollutant Emissions from Plant Operations

Criteria Pollutant	No-Action Alternative[1] (1,100-MW Plant) (tons)	Proposed Action Alternative[2] (750-MW Plant) (tons)
Volatile organic compounds (VOC)	79	82
Carbon monoxide (CO)	967	2,656
Nitrogen oxides (NO_x)	356	1,614
Sulfur dioxide (SO_2)	202	1,352
PM_{10}	435	875
Hazardous air pollutants (HAPs)	19.4	87.1

SOURCE: [1] Bureau of Land Management 2003a
[2] ENSR Corporation 2006a
NOTES: MW = megawatt
PM_{10} = particulate matter less than or equal to 10 microns

4.8 NOISE

4.8.1 Methods

An assessment of the potential for a project to result in adverse noise or vibration impacts requires an evaluation of the basic components listed in Section 3.8.1.

4.8.2 No-Action Alternative

4.8.2.1 Impacts

No noise-sensitive receptors would be close enough to the plant to be adversely affected.

4.8.2.2 Mitigation

Mitigation would not be required.

4.8.3 Proposed Action Alternative

4.8.3.1 Impacts

The proposed coal-fired power plant would have a different and larger site plan than the previously analyzed gas-fired plant to accommodate the coal and coal-handling facilities that would provide additional noise sources. The overall acoustic emission from the 750-megawatt (MW) plant, including the coal-processing facilities, is estimated to be approximately equal to those associated with the higher-power-output (1,100-MW) plant. Therefore, the power generation facilities would create an equal or smaller acoustical footprint than the No-Action Alternative. Additionally, no noise- or vibration-sensitive receptors are located in proximity to the additional machinery associated with onsite movement and unloading of the coal-supply train (e.g., shakeout); transport and on site stockpiling of coal, limestone or other materials; mechanized processing (e.g., pulverization, onsite conveyance) of materials.

During final construction, a method used to clean piping and testing called “steam blows” can produce noise as loud as 130 A-weighted decibels (dBA) at a distance of 100 feet. A steam blow results when high-pressure steam is allowed to escape into the atmosphere through the steam piping to clean it. A

series of short steam blows, lasting 2 or 3 minutes each, would be performed several times daily over a period of 2 or 3 weeks. Steam blows are necessary after erection and assembly of the feedwater and steam systems because the piping and tubing that comprise the steam path accumulate dirt, rust, scale, and construction debris. Steam blows prevent debris from entering the steam turbine

This 31-mile-long rail line would traverse areas not previously evaluated regarding noise or vibration issues. This rail line is proposed to operate one full and one empty train per day (a total of two train pass-bys per day). The trains typically would consist of two to three locomotives and 80 to 100 railcars.

The throttle setting of the locomotive was assumed to be in notch 8, a very typical setting. There are no noise- or vibration-sensitive uses in proximity to the rail line, except possibly in the vicinity of the proposed rail line's connection to the existing UPRR line, where train activity on the mainline track presently contributes to elevated sound levels. Through use of the Federal Railroad Administration/ Federal Transit Administration screening methodologies, it was determined that no sensitive uses are present in the vicinity of the project's power generation facility or along the proposed rail alignment; therefore, they are not close enough to be affected by project noise or vibration. The train speed would average 30 miles per hour with a maximum speed of 45 miles per hour. Because there are no public-highway and one at-grade railroad crossings along the project route, the sounding of the locomotive warning horn would be rare and would not contribute to the ordinary noise emission of the trains.

The Section of Environmental Analysis of the U.S. Surface Transportation Board assesses the potential noise effects from future train operations. They study whether predicted noise levels at noise-sensitive receptors (if any) along the rail routes under consideration would exceed 65 dBA, based on the Day-Night Average Sound Level (L_{dn}), and whether those receptors would experience a 3 dBA or greater increase above existing noise levels. However, even if sensitive uses were present, modeling of the potential railroad noise emissions (away from the junction with the UPRR line) indicate that 65 dBA L_{dn} would occur only within 50 feet of the new rail line, and at distances greater than 200 feet, the average sound level of 55 dBA is not exceeded, which is the EPA-recommended noise level for sensitive land. The additional project train would not cause a 3-dBA increase in the existing L_{dn} near the existing line under any circumstances. No noise-sensitive receptors would be close enough to the plant to be adversely affected.

4.8.3.2 Mitigation

Steam blows would be limited to daytime hours. The piping would be equipped with a silencer that would reduce noise levels by 20 dBA to 30 dBA.

4.8.4 Summary of Impacts

No noise or vibration impacts are expected due to the lack of noise-sensitive receptors and the low volume of train traffic along the rail line.

4.9 GEOLOGY, SOILS, AND MINERALS

4.9.1 Methods

The environmental consequences resulting from implementation of the No-Action Alternative or the Proposed Action Alternative are identified and measured by comparing the current conditions described in Chapter 3 to the conditions that would be expected after implementation of the action. Field visits and review of topographic and geologic maps and aerial photography were performed to assess the geology of the project area. The impacts on geology, soils, and mineral resources are characterized by a description of the impact, including the location of the impact and the type of impact (how the resource is affected). Impacts are characterized further by quantifying the impact by area or acreage, where possible. Two categories of disturbance were evaluated—temporary disturbance and long-term disturbance. Temporary

disturbance are areas impacted only during construction activities, and long-term disturbance refers to those areas impacted during the operation of the project.

4.9.2 No-Action Alternative

4.9.2.1 Impacts

Geology

There are no unique geologic features or geologic resources within the project area that would be impacted by construction of the power plant (BLM 2003a). Groundwater withdrawal to meet the water requirements of the proposed project would not affect important geological features in the area. Since groundwater pumping would occur in the deep carbonate rock aquifer rather than valley fill deposits, these activities would not be expected to contribute to land subsidence in the area.

Soils

The No-Action Alternative would result in soil disturbance on approximately 963 acres at the power plant site and on all construction rights-of-way. Because the project is designed to minimize disturbance to soils and temporary rights-of-way would be reclaimed, 199 acres would be impacted in the long term by the construction of project facilities. Temporary impacts would include removal and disruption of surface soils over a broad area, including equipment and material staging areas, railroad alignment, access road, and the facility footprint. Temporary impacts due to stormwater exposure or construction activities could be mitigated using best management practices for erosion containment of sediments. Permanent impacts from stormwater and construction events could be mitigated through facility design parameters including stormwater-flow-control and erosion-control structures. By implementing standard best management practices for construction activities and long-term facility operations, the impact to soils and the geology could be minimized.

Soils at the project area are predominately Mormon Mountain, Mormon Mesa, Tule Desert, and Toquop Wash fine sandy and silty loams. Increased and concentrated runoff of stormwater from the project facilities on the power plant site would have some minimal impact on erosion of these soils at discharge locations. Over time, channeling of runoff would cause downward and head-ward erosion of soils due to the moderate permeability of the loam. The depth of this erosion would likely be limited, however, by shallow caliche present beneath areas of the proposed project. Impacts to the younger and older alluvium and the Muddy Creek Formation, typified by horizontal units of bedded sands, silts, and sandy/clayey silts with layers of coarse sands and gravels, would be limited by the presence of the caliche.

During project construction, the disturbances to soil may result in temporary increases in wind-blown dust and erosion. When construction is completed, the implementation of best management practices and standard operating procedures would mitigate impacts to soils (see Section 4.9.2.2). Increased soil disturbance may result from paving the access road, which would increase the potential for localized runoff and erosion and would allow access by OHVs, and therefore disturbance, to more areas.

Poor soil development in the arid climate, and natural surface erosion by wind and water, are conducive to the formation of biological soil crusts: cryptogrammic soil that consists of algae and bacteria masses that slowly form a congealing crust on loose sand and silt on the ground surface, forming the first stage of a soil horizon. If disturbance areas include biological soil crusts, its loss would be a permanent and direct impact because it is slow to form, fragile, and easily damaged or destroyed during construction.

Minerals

Although there are known mineral deposits and mining claims in nearby mountains, and there are fluid-mineral leases southeast of the plant site, there are no known mineral resources, mining claims, or leaseholds in the area that would be disturbed by construction of the project. Future conditions for mineral resources are expected to be the same as current conditions because of the limited resource potential in the project area. Thus, there would be no impacts to mineral resources or resource uses within the project area.

4.9.2.2 Mitigation

Some soil would be disturbed during construction, but most areas would be reclaimed. Note that best management practices and mitigation measures identified under biological resources (for vegetation) would have coincident beneficial effects on soils by mitigating loss of vegetative cover.

The 2003 EIS identified the following measures as standard operating procedures that would be implemented as part of the No-Action Alternative:

- Mitigating the disturbance to biological soil crust in construction areas could be warranted as part of permitting and site reclamation activities. A pre-construction survey would identify and map areas having biological soil crust. Prior to construction, these areas could be protected by fencing or the relocation of certain plant-site facilities to minimize impacts to soil crust. Methods to reclaim or restore damaged biological soil crust also could be researched and implemented where practical.
- Planting native grasses, forbes, trees, or shrubs beneficial to wildlife, or placing riprap and other materials as appropriate, would be used to prevent and minimize the potential for erosion and siltation during construction of project features and during the period needed to reestablish permanent vegetative cover on disturbed sites. Sediment fences would be used where appropriate to limit wind and water erosion, and water trucks would be used in disturbed areas during construction to limit wind erosion.
- Final erosion control and site restoration measures would be initiated as soon as a particular area is no longer needed for construction, stockpiling, and access. Clearing schedules will be arranged to minimize exposure of soils.
- Cuts and fills for access roads and utility corridors would be sloped to prevent landslides and to facilitate revegetation.
- Signs would be placed along the access road to discourage OHV use of adjacent areas.
- Borrow areas would be contoured and shaped to carry the natural contour of adjacent undisturbed terrain into the borrow area.
- Soil or rock stockpiles, excavated materials, or excess soil materials would not be placed near sensitive habitats, including washes, where they might erode into these habitats or be washed away by high water or storm runoff. Plastic would be placed over stockpiles to prevent wind erosion if the stockpiles would be intended for long-term use. Waste piles would be revegetated using suitable native species after they had been shaped to provide a natural appearance.
- Treading on areas that are not immediately involved in project construction activities would be avoided to reduce potential wind erosion and fugitive dust generated during construction.

4.9.3 Proposed Action Alternative

4.9.3.1 Impacts

Geology

Impacts would be the same as the No-Action Alternative.

Soils

Soils at the project area are predominately Mormon Mountain, Mormon Mesa, Tule Desert, and Toquop Wash fine sandy and silty loams. Increased and concentrated runoff of stormwater from the project facilities on the power plant site would have some minimal impact to erosion of these soils at discharge locations. Over time, channeling of runoff would cause downward and head-ward erosion of soils due to the moderate permeability of the loam. The depth of this erosion would likely be limited, however, by shallow caliche present beneath areas of the proposed project. Impacts to the younger and older alluvium and the Muddy Creek Formation, typified by horizontal units of bedded sands, silts, and sandy/clayey silts with layers of coarse sands and gravels, would be limited by the presence of the caliche.

The types of impacts would be the same as described for the No-Action Alternative. Because an additional 1,073 acres would be disturbed during construction at the plant site and along the rail line, there would be more wind-blown dust and erosion compared to the No-Action Alternative, and more acreage with the potential for long-term soil damage to biological soil crusts.

The common soil types in the disturbed areas are Mormon Mesa Series at the plant site and along the rail line north to Toquop Gap; Aymate-Canutio and Geta-Arizo Associations along the rail line between Toquop Gap and Rainbow Pass; and Cave-Tencee Association along the rail line from Rainbow Pass to Leith Siding (U.S. Department of Agriculture 1980; National Resource Conservation Service 1990). Most of these soil types have a characteristic hardpan (caliche horizon) at depths from 10 to 36 inches. There could be restrictions on construction activities where deeper excavations occur and encounter the hardpan layer, such as for pipelines and subgrade features (BLM 2003a). However, the construction activities would not have an adverse effect on hardpan soils.

Minerals

Mining claims are located adjacent to the plant site and along the area of the proposed rail line, but there are no active mining operations near or within the proposed areas of disturbance. Future conditions for mineral resources are expected to be the same as current conditions because of the limited resource potential in the project area. There is some potential for the new access road to provide greater access to nearby mineral deposits. There also may be an increase in local demand for mineral materials for construction of the power plant. Thus, there may be minor impacts to mineral resources, particularly mineral materials, or their uses within the project area.

4.9.3.2 Mitigation

Mitigation would be the same as the No-Action Alternative.

4.9.4 Summary of Impacts

Impacts on soils related to disturbance during construction and operation of the Proposed Action Alternative would be mitigated through survey for biological soil crusts, as well as measures to reduce erosion potential.

No impacts on geologic or minerals resources are anticipated.

4.10 GROUNDWATER RESOURCES

4.10.1 Methods

Impacts on groundwater resources are characterized by a description of the impact, including the geographic area of the impact, and how the resource would be affected. Impacts are measured by changes in aquifer levels and water quality. The impacts not only included the potential project-induced effects on groundwater resources, but also the potential project-induced effects on springs and surface-water bodies.

Much of the information for this groundwater section is drawn directly from the 2003 EIS. No new data were generated for this EIS. It is currently recognized, as it was then, that there is a lack of data in three principal areas associated with the assessment of the environmental consequences to groundwater resources:

- The amount and movement of groundwater in the basin-filled deposits within the Tule Desert and Clover Valley.
- The amount and movement of groundwater in the fractured-rock aquifer underlying the Tule Desert, Clover Valley, and Virgin River Valley hydrographic areas.
- The location and amount of groundwater discharge and recharge from the fractured-rock aquifer underlying the Tule Desert and Clover Valley.

This lack of data may lead to differences in scientific opinion on the degree of potential environmental consequences both to groundwater resources and to flows in the Virgin River Valley as a result of implementation of any of the alternatives.

4.10.2 No-Action Alternative

4.10.2.1 Impacts

The 2003 EIS evaluated the potential impacts associated with pumping groundwater from the Tule Desert hydrographic basin to supply up to 7,000 acre-feet of water per year (af/yr) for 42 years to the permitted gas-fired generating plant project. An assessment of environmental impacts to groundwater resources and to the relationship between withdrawing groundwater in the Tule Desert and flows in the Virgin River was completed to support the 2003 EIS. The analysis and discussion is presented in the separate *Water Resources Technical Report* (CH2M HILL 2002a) on the regional and local hydrogeology for the 2003 EIS for the Toquop Energy Project.

It was determined through analysis in the 2003 EIS that pumping water from the fractured-rock aquifer in the Tule Desert in the amount and at rates necessary to serve the permitted gas-fired generating plant would not result in a substantial decline of groundwater levels or a significant reduction in groundwater resources. Groundwater levels in the Tule Desert would be lowered as a result of project pumping, but not to the extent that a significant reduction in the amount of available groundwater resources would occur. Pumping outside of the Tule Desert, specifically in the Virgin River Valley hydrographic area, would not result in changes to groundwater levels.

Based on aquifer test results and an analysis to estimate potential water-level decline (drawdown) presented in CH2M HILL (2002b), groundwater levels, within a radius of about 1,000 feet from a representative production well in the Tule Desert, would be lowered approximately 45 feet. The maximum amount of drawdown or water-level decline would remain above the top of the fractured-rock aquifer. No dewatering of the fractured-rock aquifer would occur at a pumping rate of 1,100 gallons per minute (1774.4 af/yr).

The same representative well would draw down the groundwater level 0.5 foot at a distance of roughly 1.5 miles in all directions from the well. Farther away from the well, or at distances greater than 1.5 miles from the well, water-level declines would be less than 0.5 foot. It was determined in the 2003 EIS that project pumping would not result in a substantial water-level decline outside of the Tule Desert because the well field would be designed so that the wells would be (1) spaced far enough apart to minimize additive effects on drawdown and (2) located at least 1.5 miles from the edge of the Virgin River Valley hydrographic area.

These results can be explained by the physical properties of the Tule Desert fractured-rock aquifer. The aquifer is characterized by a steep lateral hydraulic gradient. This is indicative of the relatively poor ability of the Tule Desert fractured-rock aquifer to transmit groundwater; it also limits the distance from a pumping well that would be affected by water-level declines. Additionally, the steep gradient means that most of the water entering the proposed supply wells would do so from the upgradient direction (from an area of higher elevation or from the north in the Tule Desert), causing the water-level declines to be less at a similar distance south of the production wells toward the downgradient (or lower elevation) Virgin River Valley.

Analysis conducted for the 2003 EIS indicated that the amount of annual groundwater flow through an approximately 4-mile-wide portion of the basin within the fractured-rock aquifer was approximately 6,500 af/yr, slightly less than the amount of water required for the gas-fired generating plant (up to 7,000 af/yr).

In the Tule Desert basin-fill deposits, the actual extent of groundwater-level decline that would be caused by project pumping is unknown because of the aquifer's complexity and limited available data. However, the amount of groundwater decline in the basin-fill aquifer would be no greater than estimated for the fractured-rock aquifer, and most likely would be considerably less based on the low ability of the basin-fill deposits to transmit water and because groundwater in the basin fill is assumed to be unconfined.

The results of the analysis previously conducted by CH2M HILL (2002a) indicate that No-Action Alternative pumping in the Tule Desert would not result in either substantial groundwater declines or a substantial loss of groundwater resources within the Virgin River Valley. This is very important because groundwater is a critical source of water for municipalities and agriculture in the region. As presented by Dixon and Katzer (2002), the available perennial yield in the lower Virgin River Valley is approximately 40,000 af/yr, even after the current local pumping in the valley, reported to be about 12,000 af/yr, is taken into account. Furthermore, the volume of groundwater in storage in the upper 100 feet of saturated sediments in the Virgin River Valley is estimated to be approximately 3 million acre-feet. Even in the absence of perennial yield, this much water in storage effectively mitigates the extent of water-level decline caused by local pumping.

Notably, based upon radiocarbon dating (carbon 14) data from the fractured-rock aquifer in the Tule Desert with the available data from municipal wells in the Virgin River Valley, it is clear that the age of the groundwater differs significantly between the two areas. This implies a different water source for each water type. Pumping in the Tule Desert, therefore, would not affect the existing municipal wells in the Virgin River Valley because they have independent sources.

Spring Discharge

Assessment of spring discharge for the 2003 EIS indicated that pumping water from the fractured-rock aquifer in the Tule Desert in the amount and rates necessary to serve the No-Action Alternative would not result in a change in the flows of springs in the hills and mountains that rim the Tule Desert. The elevations of all the local springs are several hundred feet above the local and regional groundwater levels. This indicates that the springs are not connected to the groundwater systems of the Tule Desert.

Groundwater Quality

Groundwater quality in the fractured-rock aquifer of the Tule Desert would not be degraded as a result of the No-Action Alternative. The quality of the groundwater in the fractured-rock aquifer of the Tule Desert is likely to be highly variable across the basin because of the different compositions of the rock types (e.g., limestone or volcanic rocks). As a result, the quality of the groundwater pumped in the Tule Desert could change over time as groundwater flows from different rock types to the wells and as the influence of the specific fractures that contribute groundwater to the wells changes. These potential changes in the quality of the water pumped, however, would not imply degradation in water quality of the aquifer.

The temporary handling and storage of potential chemical substances and waste products have a slight potential to affect groundwater quality adversely at the plant location should there be a release of these substances to the environment. The potential for groundwater-quality degradation is minimal, however, because the climate is arid, which reduces the potential for infiltration of chemicals into the ground, and because the depths of the groundwater are in the range of several hundred feet.

Flow in the Virgin River

There would be no impact to the flow in the Virgin River due to pumping in the Tule Desert with this alternative. The Virgin River is not recharged by regional groundwater systems as it flows into Lake Mead.

4.10.2.2 Mitigation

No mitigation would be required.

4.10.3 Proposed Action Alternative

4.10.3.1 Impacts

Under this alternative, the demand for water would be 2,500 af/yr which is substantially less than that required for the No-Action Alternative. Based on the results of the 2002 analysis by CH2M HILL, the effects of utilization of 7,000 af/yr of groundwater from the Tule Desert were reviewed in the 2003 EIS and determined to be minimal. Therefore, the effects on the drawdown for the Proposed Action Alternative would be proportionately less than for the No-Action Alternative. The analysis conducted for the 2003 EIS indicated that the amount of annual groundwater flow through a 4-mile wide portion of the basin within the fractured-rock aquifer was approximately 6,500 af/yr, substantially more than the amount of water required for the coal-fired generating plant (only 2,500 af/yr).

Although not established at this time, there is also the possibility that water for the proposed power plant would be drawn from the Clover Valley, as the pipeline from the Lincoln County Land Act Water Development Project would commingle water from the Tule Desert and Clover Valley. Available information on local hydrogeology of the Clover Valley is limited. To date, no studies have been done to identify the location and amount of groundwater recharge and discharge from the fractured-rock aquifer and its interconnection with overlying basin-fill in the area. In the absence of this site-specific information, the results of modeling analysis for Tule Desert well field were used to consider the potential impacts from drawdown (BLM 2007c). The drawdown analysis for the Tule Desert well field was based on four wells, each pumping 1,100 gallons per minute (gpm), which translates to 1,774 af/yr. The proposed pumping rate in Clover Valley would be lower-approximately 1,450 af/yr from each well. Besides the pumping rate, the magnitude and extent of drawdown is also dependent on hydraulic characteristics of the aquifer, recharge and discharge locations, confining zones, and other boundary conditions. Assuming comparable hydrogeologic conditions in the Clover Valley, the effects of drawdown may be similarly limited to distance of 1.5 mile from the pumping well. The impacts of

groundwater pumping will be addressed in more detail in a Draft EIS for the Lincoln County Land Act Groundwater Development Project, which is the probable water source for the Toquop Energy Project.

There are no current users of groundwater from the fractured-rock aquifer within 1.5 mile of the wells that are proposed as part of the Lincoln County Land Act Groundwater Development Project in either the Tule Desert or Clover Valley. Therefore, no impacts on local users are expected to result from the groundwater pumping that would support the proposed power plant.

Groundwater levels in the basin fill are generally several hundred feet deep (CH2M HILL 2002a), and therefore no impacts to the groundwater resources resulting from surface disturbances due to construction of the coal-fired generating plant and proposed rail line would occur. Similar to the No-Action Alternative, the temporary handling and storage of potential chemical substances and waste products have the potential to affect groundwater quality adversely at the plant location should there be a release of these substances to the environment. However, a Stormwater Pollution Prevention Plan would be prepared in advance of construction. Stormwater runoff would be managed to ensure a zero-discharge facility, and to meet requirements of the U.S. Army Corps of Engineers (USACE).

4.10.3.2 Mitigation

No mitigation would be required. Under the Nevada Revised Statutes, the Nevada State Engineer governs well drilling within the state and would evaluate and issue permits to appropriate groundwater. Additional consideration or mitigation may be applied to the Lincoln County Land Groundwater Development Project through that process, or through the National Environmental Policy Act (NEPA) process that is underway for that project.

4.10.4 Summary of Impacts

It was determined through analysis in the 2003 EIS that pumping water from the fractured-rock aquifer in the Tule Desert in the amount and at rates necessary to serve the permitted gas-fired generating plant would not result in substantial declines in groundwater levels or in a significant reduction in the amount of available groundwater. Groundwater levels in the Tule Desert would be lowered as a result of project pumping, but not to the extent that a substantial depletion of groundwater resources would occur. The Proposed Action Alternative would be expected to have a comparatively smaller effect (i.e., 2,500 af/yr compared to 7,000 af/yr) on groundwater resources, since substantially fewer acre-feet of water would be required each year. The Lincoln County Land Act Groundwater Development Project Draft EIS will provide additional information on potential impacts.

4.11 SURFACE WATER RESOURCES

4.11.1 Methods

Field visits and review of various topographic and geologic maps and aerial photographs of the project area were performed to assess the site-specific surface topography within the project area. In general, Meadow Valley and Toquop Valley are southerly trending topographic lows surrounded by mountains or hills to the north, east, and west, with numerous small and larger meandering washes including Meadow Valley Wash and Toquop Wash. In evaluating the impacts on surface water, two categories of disturbance were evaluated: temporary disturbance areas and permanent disturbance areas. Temporary disturbance areas refer to those areas impacted only during construction activities, such as lay-down areas for construction supplies. Permanent disturbance areas refer to those areas impacted during the operation of the proposed power plant, such as the railroad, plant facilities, and access road. It should be noted that potential impacts evaluated under these two categories of disturbance would only occur if sufficient direct rainfall occurs.

Impacts to wetlands, riparian areas, floodplains and waters of the United States were assessed quantitatively and qualitatively based on a review of available resource data and field surveys. There are no wetlands (as defined by USACE) in the project area that would be affected by any of the alternatives. Geographic information system analysis was used to determine the acreage of potential jurisdictional waters impacted by the alternatives.

4.11.2 No-Action Alternative

4.11.2.1 Impacts

Although annual rainfall amounts are less than 10 inches per year, locally high-intensity rainfall events could cause the local ephemeral or intermittent washes in the project area to carry high volumes of runoff for brief periods of time. There are limited features of all alternatives that would be located within a Zone D flood area (undetermined flood hazards) as designated by the Federal Emergency Management Agency.

The flooding potential, however, results mainly from flows in secondary and tertiary ephemeral washes and not from flash flows in either the Toquop Wash or the South Fork Toquop Wash, the two principal ephemeral surface-water drainages in the project area. This conclusion is based on the fact that each of these larger washes has cut deep canyons or arroyos within the project area that are anticipated to contain flows that correspond to a maximum 100-year runoff events.

Six small, unnamed washes cross the power plant site. The specific disturbed area where the plant structures would be constructed straddles one of these ephemeral washes. That particular wash would, therefore, be filled and its watercourse diverted to one or more adjacent washes. As a result, the amount and rate of flow in the washes that receive the diverted flow would increase when local rainfall amounts are great enough to generate runoff.

Construction of a power plant under any of the alternatives would create areas that are impervious (covered by impermeable surfaces such as roofs, roads, or parking areas), which would increase the amount and rate of flow of runoff from local storms. The total power plant area that would be rendered impervious would be approximately 15 acres.

During both construction and operation, the linear facilities associated with the permitted power plant (such as roads, utility corridors, water pipeline, and electricity to the well field) would not affect the ephemeral washes they cross. Utilities would be buried under washes deeply enough that they would not be affected by floods or erosion. Access roads crossing washes would use culverts to channel stormwaters under the roads. They would be appropriately sized according to local requirements.

The wellhead structures associated with each well would occupy an area of 1 acre or less within the Tule Desert and would be located away from any ephemeral washes and other low-lying areas susceptible to flooding. The impervious area around each well would be small (less than 300 square feet). Construction and operation of the well field in the Tule Desert would not have any perceptible affect on surface-water hydrology.

Jurisdictional Waters

The No-Action Alternative would affect a number of named and unnamed ephemeral washes. Named ephemeral washes that would be affected by the No-Action Alternative include Halfway Wash, Toquop Wash, South Fork Toquop Wash, and Sam's Camp Wash. Grady McNure of the USACE reviewed the jurisdictional delineations of the waters of the United States during a site visit and consultation on November 14, 2002. It was determined that the access road, the power plant site, and the water line

associated with the No-Action Alternative would impact a total of approximately 0.8 acre of jurisdictional waters in the form of named and unnamed ephemeral washes.

Potential for Surface-Water Quality Degradation

Both construction and operation of the power plant would provide the opportunity potentially to affect the surface-water quality of the local washes and, in turn, the Virgin River. Water quality in the washes could be degraded by the addition of both suspended solids (sediment) and dissolved constituents (substances commonly found in stormwater runoff from parking lots and industrial areas).

During construction, earthmoving activities could increase the potential for erosion from precipitation, which in turn, would contribute additional suspended solids (sediment load) to the runoff in the local washes. During operation, diverted runoff from the wash that would be filled in to accommodate construction of the power plant could increase the potential for erosion, and, therefore, result in increased sediment loads in the receiving washes. Additionally, runoff from parking surfaces and possibly areas where plant equipment could come in contact with precipitation could add low concentrations of dissolved petroleum hydrocarbons, metals, and possibly other substances in negligible quantities to runoff to local washes. With implementation of the mitigation measures identified in the 2003 EIS, Appendix B (see Section 4.11.2.2 below), no impacts to surface-water quality are anticipated from the utilities that link the well field to the permitted power plant site or from the development and operation of the well field.

4.11.2.2 Mitigation

The 2003 EIS identified the following measures as standard operating procedures that would be implemented as part of the No-Action Alternative:

Construction activities would be scheduled to avoid exposure to flash flood waters to minimize the exposure of personnel and equipment.

A groundwater monitoring plan would be developed by the project proponent and approved by BLM. Results of monitoring would be provided to U.S. Fish and Wildlife Service (USFWS) and the Nevada State Engineer annually.

Pumped groundwater would be monitored periodically to ensure its quality is suitable for power plant operation.

All Federal and state laws related to control and abatement of water pollution would be complied with. All waste material and sewage from construction activities or project-related features would be disposed of according to Federal and state pollution-control regulations.

Activity with a high potential for causing sediment movement into washes would not be conducted during potentially high runoff periods, typically during July and August.

All disturbed ephemeral washes considered to be jurisdictional waters would be reclaimed as soon as possible according to the conditions of a Section 404 Clean Water Act permit. The highest standards for aesthetic value would be adhered to during restoration of the washbed. Where appropriate and as required by conditions of the Section 404 permit, native species capable of bank stabilization would be used to revegetate all disturbed banks.

Diversion structures would be used to redirect flows from the wash potentially impacted by the southern plant site and would be designed to minimize potential destabilization and erosion of adjacent and downgradient ephemeral washes.

Stormwater management plans would be implemented for project construction and facility operation to minimize and control erosion from stormwater runoff. Stormwater during project construction would be managed in compliance with applicable state and Federal regulations, including compliance with requirements of the National Pollutant Discharge Elimination System stormwater general permits, which would be obtained for the project. Stormwater management elements include the following:

- Application of best management practices for erosion, sedimentation, and stabilization control during construction activities, and management of oils and other substances during operation to minimize contact with stormwater
- Structural controls during operation that could include stabilized stormwater conveyance systems (swales), oil-water separators for runoff that comes in contact with affected power plant site surfaces, and sedimentation detention basins
- Monitoring and maintenance to assure long-term effectiveness of the management system

A stormwater retention basin would be constructed with sufficient dimensions to accommodate runoff from impervious surfaces at the power plant site generated by the local maximum daily rainfall event with a return frequency of 100 years or less. All runoff from the impervious surfaces would be directed to this retention basin prior to being released to the natural drainage system at flow rates equivalent to pre-development conditions. As part of coal-dust mitigation, a surfactant (e.g., Dust Tarbt) would be applied to the coal-storage pile. According to the manufacturer, the surfactants are ecologically safe. Stormwater runoff likely to contain contaminants would flow first to onsite treatment facilities (such as an oil-water separator), as appropriate, prior to being directed to the stormwater retention basin.

Construction specifications would require construction methods that prevent entrance or accidental spillage of pollutants into flowing or dry watercourses and groundwater sources. Potential pollutants and wastes include refuse, garbage, cement, concrete, sewage effluent, industrial waste, oil and other petroleum products, aggregate processing tailings, mineral salts, drilling mud, and thermal pollution.

Any construction wastewater discharged into surface waters would be essentially free of settling material. Wastewater from aggregate processing, concrete batching, or other construction operation would not enter drainages without water quality treatment. Turbidity control methods would include settling ponds, gravel-filter entrapment dikes, recirculation systems for washing aggregates, or other approved methods.

4.11.3 Proposed Action Alternative

4.11.3.1 Impacts

Impacts on the power plant site and Tule Desert well field would be the same as described in the No-Action Alternative. Where the rail line would cross ephemeral washes, bridges and culverts would be used to prevent any modifications to surface-water hydrology. Following a short-term period of increased erosion potential during construction, there should be little or no impact to surface-water hydrology due to construction and operation of the Proposed Action Alternative.

Construction activities could result in the disturbance of soils and possibly young sediments (Muddy Creek Formation). Temporary impacts would include sediment transport across the site and in shallow washes near Toquop Wash. Temporary impacts resulting from sediment uptake in stormwater could be mitigated using best management practices for erosion containment (see Section 4.11.2.2). Permanent impacts from sediment uptake could be mitigated through facility design parameters including stormwater-control and erosion-control structures. By implementing specific temporary and permanent best management practices for construction activities and long-term facility operations, the impact to surface water would be minimized.

In the event that rainfall exceeds a normal 24-hour event or is classified as a 50-year or 100-year flood, there is the potential that surface water at the Virgin River could be impacted by sediment base load and/or suspended or dissolved solids. Construction and facility operational best management practices could be developed to mitigate this possibility.

Jurisdictional Waters of the United States

The power plant site includes 2.2 acres of potential jurisdictional waters of the United States that could be impacted by construction of the Proposed Action Alternative. The proposed rail line would impact 9.6 acres of potential jurisdictional waters during construction and 4.8 acres of potential jurisdictional waters during operations of the rail line. All potential jurisdictional waters impacted would be named and unnamed ephemeral washes, with the exception of the perennially flowing Meadow Valley Wash.

Direct impacts to potential jurisdictional waters would result from construction activities such as vegetation clearing, grading, and deposition of fill materials in the ephemeral washes. Properly sized and engineered culverts or bridges (per USACE guidance) would be installed in the ephemeral washes along the railroad alignment. Therefore, there would be no indirect impacts to the function of the washes.

Construction activities within or near potential jurisdictional waters along the railroad construction ROW may result in the removal or destruction of plant materials or organic growing media, through the deposition of fill material for construction, or by accidental release of hazardous materials into the jurisdictional waters. Such disturbances have the potential to alter permanently the vegetation community within the ephemeral washes and reduce the value of these areas for use by wildlife species.

Because the Proposed Action Alternative would result in the placement of dredge or fill within potential waters of the United States, a detailed jurisdictional determination would need to be submitted to the USACE for concurrence. If the USACE determined that the ephemeral washes within the plant site and the rail line alternative were jurisdictional, permits would need to be obtained prior to construction activities commencing in accordance with Section 404 of the Clean Water Act. As part of that permitting process, in accordance with the Section 404 (b)(1) Guidelines, a detailed evaluation of the Proposed Action Alternative would be required to assess the potential impacts.

Potential for Surface-Water Quality Degradation

The types of impacts on surface-water quality degradation would be the same as described for the No-Action Alternative, although more surface area would be disturbed under the Proposed Action Alternative.

4.11.3.2 Mitigation

Best management practices (identified as standard operating procedures Section 4.11.2.2) would also be applied to the Proposed Action Alternative.

Avoiding, to the extent possible, disturbances within potentially jurisdictional waters would minimize impacts along the rail line. Bridges and culverts would be installed along the rail line to avoid jurisdictional waters. In the areas where avoidance would not be possible, established best management practices and site-specific measures would be developed to minimize the impacts. These minimization and mitigation measures would be developed as part of the consultation process with the USACE in accordance with the Clean Water Act Section 404 permit process. Measures to minimize and mitigate impacts to jurisdictional waters may include onsite measures, such as design modification of culverts and bridges, and restoration of areas identified for short-term use during construction, such as the construction

ROW of the rail line. Offsite mitigation, such as restoration or enhancement of wetlands or wetland mitigation banking, also may be considered if onsite impacts cannot be sufficiently minimized.

4.11.4 Summary of Impacts

The potential for impacts related to stormwater flow and sediment transport would be mitigated through construction of a retention basin and the implementation of best management practices (see Section 4.11.2.2). Jurisdictional waters along the rail line would be avoided through installation of bridges and culverts, and additional mitigation may be identified through consultation with the USACE.

4.12 BIOLOGICAL RESOURCES

4.12.1 Methods

This section presents a discussion of the potential impacts associated with the No-Action and Proposed Action alternatives as they affect biological resources within the project area. In most instances, impacts are categorized and described in general terms without reference to facility type or any site-specific resources. An impact on biological resources would occur if construction and/or operation of the proposed facilities would cause substantial changes to the existing abundance, diversity, distribution, or habitat value of existing plant or animal populations.

4.12.2 No-Action Alternative

4.12.2.1 Impacts

Vegetation

Construction and operation of the proposed natural-gas-fired power plant and associated facilities under the No-Action Alternative would result in direct and indirect impacts to natural vegetation communities within the project area. Direct effects on vegetation would occur from disturbance or removal of vegetation at the power plant site, along access roads, and at the water pipeline and the well field. Vegetation would be removed as a result of surface-disturbing activities associated with blading, grading, vehicular traffic, and trenching. Areas adjacent to the proposed power plant site, access roads, and water pipeline would experience temporary disturbance associated with equipment access, materials, stockpile locations, and workspace requirements. Indirect impacts would include the increased potential for the establishment and spread of invasive and noxious weeds, destruction of biotic soil crusts, exposure of soils to accelerated wind and water erosion, shifts in vegetation community composition, increase in the potential for fires, and loss of biodiversity.

Surface disturbances resulting from construction under the No-Action Alternative would be the least significant of all alternatives considered. Implementation of the No-Action Alternative would result in the direct disturbance of approximately 963 acres of native vegetation. This includes about 782 acres of Sonora-Mojave creosotebush-white bursage desertscrub, 5 acres of Mojave mid-elevation mixed desertscrub, and 1 acre of Sonora-Mojave mixed salt desertscrub (Table 4-5). Following construction, the water pipeline ROW, extra workspace areas, and unused portions of roads would be reclaimed. Thus, under the No-Action Alternative, total permanent vegetation disturbance would be reduced from approximately 963 acres to 199 acres.

Table 4-5
Vegetation Acres Affected by No-Action Alternative

Cover Type	Power Plant		Access Road		Water Pipeline		Rail Line		Well Field (Wells, Roads, Pumps)	
	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance
Inter-Mountain Basins Semi-Desert shrub steppe	–	–	–	–	–	–	NA	NA	–	–
Mojave mid-elevation mixed Desertscrub	–	–	–	–	4.8	2.4	NA	NA	–	–
North American Warm Desert bedrock cliff and outcrop	–	–	–	0.1	–	–	NA	NA	–	–
North American Warm Desert playa	–	–	–	0.4	–	–	NA	NA	–	–
North American Warm Desert wash	–	–	–	–	0.5	0.3	NA	NA	–	–
Sonora-Mojave creosotebush- white bursage desertscrub	640	100	–	40.2	85.1	42.5	NA	NA	17	12
Sonora-Mojave mixed salt desertscrub	–	–	–	0.8	–	–	NA	NA	–	–
Total acres	640	100	216*	41.5	90.4	45.2	–	–	17	12

SOURCE: Southwest Regional Gap Analysis Project 2004
NOTES: NA = not available

* Spatial data were not available to calculate the acres of vegetation within the construction right-of-way for the access road. However, the 2003 environmental impact statement (Bureau of Land Management 2003a) indicated that a total of 216 acres would be within the temporary construction ROW for the road, and it can be concluded that the greatest proportion of this area would be Sonora-Mojave creosotebush-white bursage desertscrub.

The duration of impacts on vegetation would depend, in part, on the success of mitigation and revegetation efforts and the time needed for natural succession to return revegetated areas to predisturbance conditions. Since recovery in arid environments is extremely slow, this is likely to be on the order of 20 to 30 years for Sonora-Mojave creosotebush-white bursage desertscrub.

Effective reclamation of project-related disturbances would begin after the completion of site cleanup and would be accomplished following the measures identified in Appendix E. The reclamation recommendations presented in Appendix E were developed based on the physical and biological characteristics of the project area as well as on observations of successful reclamation efforts on similar energy development projects. Therefore, assuming these measures are effectively applied, significant impacts that relate to reclamation success are not likely to occur.

Disturbance of vegetation cover would not have appreciable effects because the vegetation types that would be disturbed are common, have high frequencies of occurrence, and have wide distributions. The extent of disturbance to these vegetation types would be expected to decrease with the onset of reclamation efforts on many of the disturbed areas.

Noxious and Invasive Weeds

Construction and operation of the proposed natural-gas-fired power plant, access roads, and waterline would result in direct and indirect impacts to invasive and noxious weed species. Disturbances from construction would increase the potential for the establishment and spread of invasive and noxious weed species. These plants tend to be aggressive colonizers of disturbed areas where the native vegetation has been removed. Therefore, disturbances associated with construction of the proposed power plant, access roads, water pipeline, and well field would provide opportunities for invasive and noxious weeds to

quickly establish. Once established, noxious and invasive weeds would increase fuel levels and the potential for increased intensity and numbers of wildfires. Wildfire within the project area, where vegetation is generally intolerant of fire, could potentially lead to mortality of native plant species and transform the vegetation community from native vegetation to non-native grasslands. To minimize the potential for adverse effects from invasive and noxious weed establishment, monitoring for invasive and noxious weeds would be necessary. If noxious weeds were found, control and eradication measures would be implemented as outlined in an integrated pest management plan. Further information is available in the weed risk assessment completed for this project in Appendix C Additional indirect construction-related impacts could include soil compaction, disruption of microphytic crusts, and an increased potential for wind and water erosion of disturbed surfaces prior to reclamation. However, indirect disturbance effects from construction would be reduced to non-significant levels with the implementation of recommended and required mitigation measures.

Wildlife

Construction and operation of the proposed natural-gas-fired power plant, access roads, and waterline would result in direct and indirect impacts on wildlife and wildlife habitats. The principal impacts to terrestrial wildlife likely to be associated with the No-Action Alternative include (1) the loss of certain wildlife habitats due to construction activities such as earthmoving at the plant site and access roads, (2) habitat fragmentation, (3) direct mortality and/or displacement of some wildlife species, and (4) an increase in the potential for illegal killing and harassment of wildlife. The magnitude of impacts on wildlife and wildlife habitats would depend on a number of factors, including the type and duration of disturbance, species of wildlife present, time of year, and implementation of recommended and required mitigation measures.

Implementation of the No-Action Alternative would result in the direct disturbance of 963 acres of wildlife habitat (refer to Table 4-5). Direct disturbance to wildlife habitat includes activities such as ground-surface grading and excavation, tree and shrub removal, and/or scraping of road surfaces that disturbs surface and subsurface soils. Each of these activities could effectively remove and/or degrade existing habitat, thereby reducing its availability to local wildlife populations.

Following construction, the water pipeline right-of-way, extra workspace areas, and unused portions of roads would be reclaimed. These areas would be revegetated with seed mixes approved by BLM, some of which are specifically oriented to enhance wildlife use. The duration of impacts on vegetation would depend, in part, on the success of mitigation and reclamation efforts and the time needed for natural succession to return revegetated areas to predisturbance conditions. Grasses and forbs are expected to become established within the first several years following reclamation; however, an estimated 10 to 20 years would be required for shrub establishment and production of useable forage (Environmental Studies Board 1974; Fisser 1981; Plummer et al. 1968; Wasser and Shoemaker 1982). Thus, under the No-Action Alternative, total vegetation disturbance would be reduced from approximately 963 acres to 199 acres.

Permanent and temporary loss of habitat as a result of construction activities could affect some small mammal, reptile, and/or amphibian species with very limited home ranges and mobility. Although there is no way to accurately quantify these effects, the impact is likely to be moderate in the short term and be reduced over time as reclaimed areas produce suitable habitats. Most of these wildlife species would be common and widely distributed throughout the project area, and the loss of some individuals as a result of habitat removal would have a negligible impact on populations of these species throughout the region.

Indirect effects due to displacement of wildlife also would occur as a result of construction activities associated with the No-Action Alternative. In response to the increase in human activity (e.g., equipment operation, vehicular traffic, and noise), wildlife may avoid or move away from the sources of disturbance

to other habitats. This avoidance or displacement could result in underutilization of the physically unaltered habitats adjoining the disturbances. The net result would be that the desirability of habitats to wildlife near the disturbances would be decreased, and previous distributional patterns would be altered. The habitats would not support the same level of use by wildlife as before the onset of the disturbance. Additionally, it is anticipated that some wildlife would be displaced to other habitats, leading to some degree of overuse and degradation to those habitats.

Increases in vehicular traffic on the permitted access road could have impacts on the Mormon Mesa ACEC if the traffic were to impede wildlife activity (BLM 2003a). Public vehicle use of roads built to access facilities can have a similar, additive, or possibly a synergistic influence on reducing wildlife use of adjacent habitats, as well as cause additional impacts. Public access to new and upgraded roads in the project area would increase the potential for mortality and general harassment of wildlife. Closure of some new and existing roads to public use following construction would be one of the most effective measures that could be implemented to offset this impact.

The evaporation pond for the power plant would be located in an area with few other water sources. Because of this isolation, the pond may serve as an attractant for waterfowl, shorebirds, and other migratory birds. Evaporation ponds generally contain highly saline water. While the ions present in the pond water are generally non-toxic, the concentration levels of sodium are expected to reach up to 147,963 parts per million (BLM 2003a). Concentrations at this level can result in adverse effects to birds through salt encrustation on feathers, resulting in loss of flight, induced fatigue, dehydration, and death. Similar outcomes apply to bats and terrestrial wildlife.

Bird collisions with cooling towers are rare; however, when strikes occur, it is generally when (1) a cooling tower transects a daily flight path used by a concentration of birds and (2) migrants are traveling at reduced altitudes and encounter tall structures in their path (Brown 1993). Collision rates generally increase in low-light conditions; during inclement weather, such as rain or fog; during strong winds; and during panic flushes when birds are startled by a disturbance or are fleeing imminent danger. Collisions are more probable near wetlands, valleys, and within narrow passes where towers intersect flight paths. Although there is no way to accurately quantify these potential impacts, effects would be minor as the project area is not considered a significant migration corridor for birds.

No direct or indirect impacts on aquatic habitats and fisheries of the Virgin River would result from groundwater pumping from the No-Action Alternative. No short-term impacts from groundwater pumping on the availability of water for wildlife are anticipated.

Special Status Species

In general, construction and operation impacts of the No-Action Alternative on special status plant and wildlife species and their habitats would be similar to those discussed in the preceding sections for vegetation communities and wildlife. However, these impacts can be more severe for special status plant and wildlife species, since the distribution and abundance of many of these species are limited in the project area and surrounding region.

No federally listed plant species were identified as occurring within or near the project area. However, the water pipeline traverses several high-density areas of cacti and Joshua trees, which are protected species under Nevada state law. The proposed water pipeline associated with this project is likely to lead to the removal of some of these cacti and Joshua trees. Where these plants cannot be avoided, they would be salvaged and transplanted out of harm's way, as directed by the BLM botanist.

Special status wildlife species most likely to be affected adversely by construction activities associated with the natural-gas-fired power plant and associated facilities include the desert tortoise, Gila monster, and western burrowing owl. Construction activities could directly kill or injure these species through vehicle strikes and through animals becoming crushed or buried as a result of construction, digging, and earthmoving activities. These activities could also affect the desert tortoise, Gila monster, and burrowing owl by substantially reducing or eliminating associated habitat for these species.

With regard to special status wildlife species, impacts from the construction of the proposed power plant and associated facilities would likely be greatest for the desert tortoise. Approximately 640 acres of desert tortoise habitat would be disturbed, 120 of which would be permanent, as a result of construction of the natural-gas-fired power plant. An additional 216 acres, 42 of which would be permanently disturbed for the access road for the power plant, are within critical desert tortoise habitat.

Any potential adverse impacts on the desert tortoise under the No-Action Alternative would be mitigated by implementation of the specific terms and conditions to reduce take of desert tortoises issued by USFWS in its Biological Opinion of July 23, 2003. The specific terms and conditions of the Biological Opinion specify that the access road and the facility would be fenced to meet the requirements for tortoise exclusion from the power plant and to minimize or eliminate the potential for mortality from vehicle strikes. In addition, tortoise undercrossings would be constructed on the access road at intervals of no greater than 1 mile to decrease potential habitat fragmentation associated with linear facilities.

4.12.2.2 Mitigation

In the 2003 EIS, the following measures were identified as standard operating procedures that would be implemented as part of the proposed project to ensure minimal adverse effects to existing vegetative communities, wildlife, and special status plants and animals.

Vegetation

To the maximum extent practicable, all trees, native shrubs, and other vegetation would be preserved and protected during construction operations, and equipment except where clearing operations are required for permanent structures, approved construction roads, and excavation operations.

To the maximum extent practicable, all maintenance yards, field offices, and staging areas would be arranged to preserve trees, shrubs, and other native vegetation. The width of all new permanent access roads shall be kept to the absolute minimum needed for operation, avoiding sensitive areas and trees where possible, and limiting disturbance to vegetation.

When and where applicable, landscaping standards, including clearing of native vegetation, would be followed as prescribed by local land use and management agencies when work is within their jurisdictions.

Vegetation salvage and replanting would be implemented and completed as required by BLM in accordance with its established guidelines. Adopting roadway signage that discourages off-road travel would help protect vegetation along road margins.

Agency review and assessment of project-associated impacts on vegetation may precipitate a mitigation requirement to salvage various plants located inside the construction zone. Protected or otherwise sensitive plants (such as Joshua trees and numerous species of cacti and yucca) would have to be identified and removed from the construction corridor prior to the onset of construction. Salvaged plants would then be held for replanting along construction zone margins, other project-affected areas (e.g., former equipment staging grounds), or alternative lands. Plant salvage activities would probably have the greatest likelihood for success if they are not carried out in the spring flowering season.

The upper 12 to 18 inches of soil would be removed from the trench area and stockpiled for later use.

Wildlife

Bird nests encountered during land-disturbing construction activities would be avoided while the birds are fledging. To the extent practicable, land-disturbing construction activities would be scheduled outside of the breeding season (March 15 through July 30). If construction is required during the breeding season, the area impacted would be surveyed for nests prior to construction.

Special Status Species

Desert Tortoise

The protective measures below would be implemented during project construction, operation, and maintenance to ensure minimal adverse effects to desert tortoises and their habitat. These measures incorporate the specific terms and conditions in the Biological Opinion issued by USFWS on July 23, 2003, to reduce the take of desert tortoises (USFWS 2003).

A qualified desert tortoise biologist would be present during surface-disturbing activities from March 1 through October 30 (the desert tortoise's active season) in areas that have not been enclosed with tortoise fence to assure that desert tortoises are not harmed inadvertently, unless BLM and USFWS have determined that the presence of a biologist would not be necessary. The biologist would be on call from October 16 through March 14 (the inactive season) and would check construction areas immediately before construction activities begin at all times. In addition, a qualified desert tortoise biologist would be on site during any construction within critical habitat.

If fence construction occurs during the desert tortoise's active season, a qualified tortoise biologist would be onsite during construction of the tortoise fence to assure that no tortoises are harmed. During the active season, temporary or permanent tortoise fencing would be required to be installed for all areas of surface-disturbing activities prior to the onset of construction activities. If the fence is constructed during the tortoise's inactive season, a biologist would thoroughly examine the proposed fence line and burrows for the presence of tortoises no more than three days before construction commences.

Any desert tortoises or their eggs found within the fence line would be relocated off the site by a qualified tortoise biologist in accordance with approved protocol (Desert Tortoise Council 1999). Tortoise burrows that occur immediately outside of the fence alignment that can be avoided by fence construction activities would be clearly marked to prevent them from being crushed. A temporary-fencing plan would be implemented during construction to protect tortoise habitat.

Permanent fencing to exclude tortoises would be required on the access road from I-15 to the proposed plant site. In addition, a tortoise fence would be constructed around the power plant site. In accordance with current specifications, fencing would consist of 1-inch-horizontal by 2-inch-vertical mesh. The mesh would extend at least 18 inches above ground and, where feasible, 6 to 12 inches below ground. In situations where it is not feasible to bury the fence, the lower 6 to 12 inches of the fence would be bent at a 90-degree angle towards potentially approaching tortoises and covered with cobble or other suitable material to make sure that tortoises or other animals cannot dig underneath and create gaps that allow passage. Along the access road tortoise undercrossings would be provided at intervals of not greater than 1 mile. It is anticipated that only two or three undercrossings specifically placed for tortoises would be needed to meet this objective, since most of the access road is in terrain that would require frequent culverts for drainage purposes that could also be designed to function as tortoise crossings.

The fence would be inspected on a quarterly basis and after major precipitation events to verify zero ground clearance. Any repairs would be completed within 72 hours from March 15 through October 15,

and within 7 days from October 16 through March 14. Monitoring and maintenance would include regular removal of trash and accumulated sediment and the restoration of zero ground clearance between the ground and the bottom of the fence, including re-covering the bent portion of the fence, if not buried. Fencing may be removed upon termination and reclamation of the project, or when it is determined by BLM and USFWS that the fence is no longer necessary.

During surface-disturbing activities, tortoise burrows would be avoided whenever possible. If a tortoise is found on site during project activities that might result in take of the tortoise (harm, displacement, harassment, wounding, trapping, capture, or killing), such activities would cease until the tortoise moves or is moved. A qualified tortoise biologist would move the tortoise. All workers would also be instructed to check underneath all vehicles before moving them, and also within stockpiled materials. Tortoises often take cover under vehicles and construct burrows in stockpiled material.

Construction sites, staging areas, and access routes would be cleared by a qualified tortoise biologist before the start of construction. The project area would be surveyed for desert tortoise using survey techniques that provide 100 percent coverage. From March 15 through October 15, the preconstruction clearance shall take place no more than three days prior to initiation of construction; from October 16 through March 14, the preconstruction clearance would take place no more than 10 days prior to initiation of construction. All desert tortoise burrows, and other species' burrows that might be used by tortoises, would be examined to determine whether desert tortoises and other species occupy the burrow. Tortoise burrows would be cleared of tortoises and their eggs, and collapsed. Any desert tortoises or tortoise eggs found in the fenced area would be removed under the supervision of a qualified tortoise biologist in accordance with USFWS protocol (Desert Tortoise Council 1999).

BLM must approve the selected consulting firm/biologist to be used by the applicant to implement the terms and conditions of ROWs issued by BLM regarding the desert tortoise. Any biologist and/or firm not previously approved must submit a curriculum vitae and be approved by the BLM before being authorized to represent BLM in complying with the terms and conditions of the ROWs. BLM has the option of selecting an independent third-party contractor to act as an agent of BLM. Other personnel may assist with implementing terms and conditions that involve tortoise handling, monitoring, or surveys, only under direct field supervision by the approved qualified biologist.

Tortoises and nests would be handled and relocated by a qualified tortoise biologist in accordance with USFWS-approved protocol (Desert Tortoise Council 1999). Burrows containing tortoises or their nests would be excavated by hand, with hand tools, to allow removal of the tortoise or eggs. Desert tortoises moved during the tortoise's inactive season or those in hibernation, regardless of date, would be placed into an adequate burrow; if one is not available, one would be constructed in accordance with Desert Tortoise Council (1999) criteria. During mild temperature periods in the spring and early fall, tortoises removed from the site would not necessarily be placed in a burrow. Tortoises and burrows would only be relocated to federally managed lands. Verbal permission, followed by written concurrence, would be obtained from BLM and USFWS before relocating the tortoise or eggs to lands not managed by BLM.

Tortoises that are moved off the site and released into undisturbed habitat on public land would be placed in the shade of a shrub, in a natural unoccupied burrow similar to the hibernaculum in which it was found, or in an artificially constructed burrow in accordance with a USFWS-approved protocol (Desert Tortoise Council 1999).

After a project has been fenced and a tortoise clearance completed, if a desert tortoise is encountered in imminent danger, it would be moved out of harm's way and onto adjacent BLM land by personnel that have completed the training required in Terms and Conditions 8.h of the Desert Tortoise Council (1999) criteria. If the tortoise cannot be avoided or moved out of harm's way onto BLM land, it would be placed

in a cardboard box or other suitable container and held in a shaded area until BLM personnel can retrieve the tortoise.

If possible, overnight parking and storage of equipment and materials, including stockpiling, would be in previously disturbed areas or areas to be disturbed that have been cleared by a tortoise biologist. If not possible, areas for overnight parking and storage of equipment would be designated by the tortoise biologist.

All vehicular traffic would be restricted to existing access roads or those roads approved by BLM in consultation with the USFWS.

Project activity areas would be clearly marked or flagged at the outer boundaries before the onset of construction. All activities would be confined to designated areas. Blading of vegetation would occur only to the extent necessary and would be limited to areas designated for that purpose by BLM or tortoise biologist.

Prior to issuance of any Federal permit, lease, or authorization for any surface-disturbing activity, the project proponent would pay a remuneration fee for each acre of surface disturbance. The amount and disposition of said fee would be determined in consultation with BLM and USFWS. This fee would be paid directly to the Lincoln County Habitat Conservation Section 7 Account, Attn: Cathy Hiatt. PO Box 416, Pioche, Nevada, 89043, administered by Clark County or any other administrator approved by both the USFWS and BLM. The administrator would serve as the banker of these funds and receive no benefit from administering these funds. These funds would be independent of any other fees collected by Clark County for desert tortoise conservation planning.

Projects resulting in residual impacts would require the submission of a BLM- and USFWS-approved reclamation plan, unless BLM and USFWS determine that reclamation rehabilitation is not necessary. The reclamation/rehabilitation plan would describe objectives and methods to be used, species of plants and/or seed mixture to be used, time of planting, success standards, and follow-up monitoring. Depending on the size and location of the project, reclamation could simply involve recontouring, rehabilitation and restriction of access points, or intensive reclamation over the entire area of surface disturbance. The plan would be prepared within 60 days following completion of the surface-disturbance phase of the project. Reclamation would be addressed on a case-by-case basis.

Upon receipt of an application or expression of interest in the expansion of a materials site right-of-way within desert tortoise ACECs, BLM would notify USFWS and initiate a 60-day evaluation period. During the evaluation period, BLM and USFWS would consider options to minimize impacts to desert tortoise habitat, such as relocation of areas outside ACECs, other potential sources, and other measures.

If a substantial level of disturbance occurs within a desert tortoise ACEC (e.g., expansion of materials sites within ACECs), the proponent would rehabilitate an equivalent number of acres within an ACEC in the same recovery unit, within six months, or relinquish a similar area to BLM. These actions would occur in addition to payment of remuneration fees and other minimization measures in the USFWS Biological Opinion.

A litter-control program would be implemented to minimize predation on tortoises by ravens drawn to the project site. This program would include the use of covered, raven-proof trash receptacles, removal of trash from project areas to the trash receptacles following the close of each work day, and proper disposal of trash in a designated solid waste disposal facility. Appropriate precautions must be taken to prevent litter from blowing out along the road when trash is removed from the site. A litter-control program

would be implemented by the responsible Federal agency or its contractor to minimize predation on tortoises by ravens and other predators drawn to the project.

A tortoise-education program would be presented to all personnel working on the project or activities associated with the project. This program would be presented by a qualified tortoise biologist. The program would include information on the life history of the desert tortoise, legal protection for desert tortoises, penalties for violations of Federal and state laws, general tortoise-activity patterns, reporting requirements, measures to protect tortoises, terms and conditions of the BLM-issued ROWs, and personal measures that employees could employ to promote the conservation of desert tortoises. The definition of "take" would also be explained. Specific and detailed instructions would be provided on the proper techniques to capture and move tortoises that appear on site, in accordance with USFWS-approved protocol. Currently, USFWS-approved protocol is Desert Tortoise Council (1999).

The project applicant would notify BLM's authorized project officer at least 10 days before initiation of any project. Notification would be made to BLM staff in Caliente at (775) 726-8100, or Ely at (775) 289-1800.

BLM's Caliente or Ely offices and USFWS's Southern Nevada Field Office must be notified of any desert tortoise death or injury resulting from project implementation by close of business on the following work day. In addition, USFWS's Division of Law Enforcement would be notified in accordance with reporting requirements. BLM can be reached in Caliente at (775) 726-8100 and in Ely at (775) 289-1800; USFWS can be reached at (702) 647-5230.

All appropriate Nevada Department of Wildlife (NDOW) permits or letters of authorization would be acquired prior to handling desert tortoises and their parts, and prior to initiation of any activity that might require handling tortoises.

The project proponent must submit a document to BLM within 30 days of completion of the project, showing the number of acres disturbed; remuneration fees paid; and number of tortoises taken, which includes capture and displacement, killed, injured, and harassed by other means, during project activities covered under the USFWS's Biological Opinion.

All projects to be covered under the USFWS's Biological Opinion would be reviewed by BLM's wildlife staff to assure that appropriate measures have been incorporated into the BLM authorization (for example, material site, land sale, or OHV event) to minimize the potential take of desert tortoise and loss of habitat.

BLM would keep an up-to-date log of all actions taken under consultation; number of acres affected; results of tortoise survey and removal activities (including reported number of desert tortoises injured, killed, or removed from project site); date, rate (per acre adjusted for inflation) and amount of fees paid for each project; and progress of recovery actions. BLM would provide information to USFWS's Southern Nevada Field Office annually. Annual reports would be due on February 1, for the previous calendar year in which actions were covered under the USFWS's Biological Opinion. Information would be cumulative throughout the life of the consultation. Annual reports would include maps showing the location of actions within ACECs authorized under the Biological Opinion and any other information it requires.

For those actions identified in the Biological Opinion that require concurrence between BLM and the USFWS, written notification of proposed changes or actions would be made a minimum of 30 days in advance. Both agencies would coordinate to the maximum extent practicable to achieve resolution. This may include informal meetings or written correspondence to discuss Proposed Action Alternatives and reach concurrence.

In accordance with *Procedures for Endangered Species Act Compliance for the Mojave Desert Tortoise*, a qualified desert tortoise biologist should possess a bachelor's degree in biology, ecology, wildlife biology, herpetology, or closely related fields as determined by BLM. The biologist must have demonstrated prior field experience using accepted resource agency techniques to survey for desert tortoises and tortoise sign, which should include a minimum of 60 days of field experience. All tortoise biologists shall comply with the USFWS-approved handling protocol prior to conducting tasks in association with terms and conditions of the USFWS Biological Opinion. In addition, the biologist would have the ability to recognize tortoise sign and accurately record survey results.

A BLM representative(s) would be designated to be responsible for overseeing compliance with the reasonable and prudent measures, terms, and conditions, reporting requirements, and re-initiation requirements jointly agreed to by BLM and USFWS. The designated representative would provide coordination among the permittee, project proponent, BLM, and the USFWS.

In the event that blasting is required, prior to blasting a 200-foot area, the blasting site and surrounding areas would be surveyed for desert tortoises using 100-percent-coverage survey techniques. All tortoises found above ground or in pallets within this 200-foot radius of the blasting site would be moved 500 feet from the blasting site. Additionally, tortoises in burrows within 75 feet of the blasting would be placed into an artificial or unoccupied burrow 500 feet from the blasting site. This would prevent tortoises that leave their burrow upon translocation from returning to the blasting site. Tortoises in burrows at a distance of 75 to 200 feet from the blasting site would be left in their burrows. Burrow locations would be flagged and recorded using a global positioning system (GPS) unit and burrows would be stuffed with newspapers. Immediately after blasting, newspaper and flagging would be removed.

Miscellaneous Other Species

Collapsing suitable burrows or other potential nesting cavities within the construction zone prior to the nesting season could largely prevent direct impacts that might otherwise occur on burrowing owls. This would be accomplished, where appropriate, as part of the surveys for the desert tortoise. If owl-occupied burrows are located during their nesting or brooding season (mid-March through August), burrows would be avoided until the young owls leave the nest or it is determined that the nesting attempt failed.

Gila monsters in immediate danger from construction activities would be captured and confined in a cool, shaded environment by a biologist in accordance with NDOW protocols. Removal of a Gila monster requires authorization by NDOW. Injured Gila monsters would be transferred to a veterinarian. Dead Gila monsters would be preserved for NDOW.

Impacts on chuckwalla would be minimized by restricting activity in upland areas occupied by this species. Chuckwallas typically hide in rock crevices and other similar shelters when approached or threatened, making it difficult to capture and relocate them. However, trained personnel would remove them prior to construction if necessary. Permission from NDOW would be obtained prior to removing or relocating chuckwallas.

If significant bat roosts are located within or adjacent to a construction zone, the roosts would be avoided until the animals naturally vacate the site. Certain types of bat refuges, such as winter roosts used by non-hibernating California leaf-nosed bats, would be completely avoided if practicable. Certain naturally occurring caves, and even some abandoned mines, could provide the necessary temperature regimes critical to maintaining some local bat populations.

Signs warning of bighorn sheep crossings would be placed along the access road to reduce potential mortalities resulting from collisions with vehicles.

4.12.3 Proposed Action Alternative

4.12.3.1 Impacts

Vegetation

Impacts on vegetation under this alternative would be the same as the No-Action Alternative, except that the scope of effects would increase incrementally due to the addition of the rail line and increased size of the power plant. Approximately 1,661 acres of vegetation would be disturbed by construction activities under the Proposed Action Alternative. This includes at least 1,348 acres of Sonora-Mojave creosotebush-white bursage desertscrub, 98 acres of Mojave mid-elevation mixed desertscrub, 27 acres of North American Warm Desert bedrock cliff and outcrop, 10 acres of North American Warm Desert wash, 2 acres of Sonora-Mojave mixed salt desertscrub, and less than an acre of Inter-Mountain Basins Semi-Desert shrub steppe (Table 4-6).

Following reclamation efforts, disturbed acreage would be reduced to an estimated 731 acres. Vegetation would start to become reestablished along the water pipeline and unused portions of the access roads and railroad beginning the first year after site cleanup and project startup and continue throughout the 50-year life of the project.

Implementation of the Proposed Action Alternative also would increase the potential for occurrence of indirect effects and the scope of those effects. Disturbances from construction would increase the potential for indirect effects as described for the No-Action Alternative. However, the scope of the impacts would increase incrementally, as an additional 698 acres over the No-Action Alternative would be disturbed initially during construction of the rail line, with 356 acres being disturbed permanently.

Table 4-6
Vegetation Acres Affected by the Proposed Action Alternative

Cover Type	Power Plant		Access Road		Water Pipeline		Rail Line		Well Field (Wells, Roads, Pumps)	
	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance	Temporary Disturbance	Permanent Disturbance
Inter-Mountain Basins Semi-Desert shrub steppe	–	–	–	–	–	–	0.5	0.1	–	–
Mojave mid-elevation mixed desertscrub	–	–	–	–	4.8	2.4	93.4	47.2	–	–
North American Warm Desert bedrock cliff and outcrop	–	–	–	0.1	–	–	27.2	13.7	–	–
North American Warm Desert playa	–	–	–	0.4	–	–	–	–	–	–
North American Warm Desert wash	–	–	–	–	0.5	0.25	9.1	4.1	–	–
Sonora-Mojave creosotebush-white bursage desertscrub	640	475	–	40.2	85.1	42.5	565.7	290.2	17	12
Sonora-Mojave mixed salt desertscrub	–	–	–	0.8	–	–	1.7	1.0	–	–
Total acres	640	475	216*	41.5	90.4	45.2	697.6	356.3	17	12

SOURCE: Southwest Regional Gap Analysis Project 2004

NOTE: * Spatial data were not available to calculate the acres of vegetation within the construction ROW for the access road. However, the 2003 environmental impact statement (Bureau of Land Management 2003a) indicated that a total of 216 acres would be within the temporary construction right-of-way for the road, and it is assumed that the greatest proportion of this area would be Sonora-Mojave creosotebush-white bursage desertscrub.

Noxious and Invasive Weeds

The increased area of disturbance would incrementally increase the indirect effects associated with noxious and invasive weeds. Additional effects related to the construction and operation of the proposed rail line include increased likelihood of weeds establishing and spreading along the proposed rail line during construction. These weeds would then be likely to spread along the length of the rail line increasing the effects described in Section 4.12.2.1.

Weeds and invasive non-native plants pose a threat, in that they overtake shrub steppe ecosystems and they increase the ground canopy, which in turn unbalances the natural fire regime by promoting more frequent and intense fires. The proposed rail line also would serve as a potential ignition source for wildfires. However, given the implementation of recommended and required mitigation measures, including development and implementation of an integrated pest management plan, significant impacts on vegetation are not expected to occur under the Proposed Action Alternative. Further information is available in the weed risk assessment completed for this project in Appendix D.

Increased levels of nitrogen in the soil surrounding the plant may occur as a result of deposition from nitrogen oxides in plant emissions. Increased levels of nitrogen may increase the establishment and spread of noxious and invasive weeds. Modeled total nitrogen deposition levels for the area within 40 km of the proposed plant range from 2.0 E^{-7} to 3.4 E^{-6} grams per square meter per year ($g/m^2/yr$) (ENSR 2007c). A study of the effects of nitrogen on non-native plants in the Mojave Desert found that rates of deposition of 3.2 g/m^2/year were sufficient to impact plant populations (Brooks 2003). While the study did not determine minimum levels for impacts from nitrogen deposition, the levels of deposition modeled for the Toquop Energy Project are 6 orders of magnitude lower than those observed having a significant impact in the study. Given the low levels of total nitrogen deposition and the implementation of recommended and required mitigation measures, including development and implementation of an integrated pest management plan, significant impacts are not expected to occur.

Wildlife

While the disturbance of wildlife habitat from construction of the power plant, access roads, and the water pipeline are generally the same as those described in the No-Action Alternative, an additional 698 acres of wildlife habitat (1,661 acres total) would be affected by construction of the proposed rail line and coal-fired plant. Following initial reclamation efforts, disturbed acreage associated with the construction of the proposed rail line and coal-fired plant would be reduced to an estimated 930 acres on which ongoing project activities remain throughout the 50-year life of the project. Low levels of impact would likely result to various species of non-game songbirds, small mammals, and reptiles in the short term. As with the No-Action Alternative, these impacts are not expected to adversely affect populations of these species because of their high reproductive potential and the availability of other suitable habitats within the project area and surrounding region.

Special Status Species

The potential impacts on special status plant and wildlife species are similar to those presented under the No-Action Alternative. Of those plant species listed in Chapter 3 for consideration by BLM or USFWS, the Meadow Valley sandwort and Las Vegas buckwheat were documented within the project area.

Meadow Valley sandwort is on the Nevada Native Plant Society watch list and is on the Nevada Natural Heritage Program's sensitive species list. A small number of sandwort plants were documented along the banks of Toquop Wash in the Toquop Gap area. The proposed rail line would pass through Toquop Gap and may affect the sandwort in this location if it is placed along the south bank of the wash. If the rail line is located on the south bank of the wash, this would lead to impacts on suitable habitat for this species. Impacts on this plant and its habitat potentially would be a significant impact, mitigable by pre-

construction surveys and avoidance measures as described in Section 4.12.3. If the rail line is constructed on the north bank, then direct impacts from the Proposed Action Alternative would not be anticipated.

Las Vegas buckwheat is a BLM-sensitive species in Nevada and is recommended for full protection by the State of Nevada. It also is listed as threatened by the Nevada Native Plant Society. Due to recent threats to the limited remaining populations of the species, it has been submitted to USFWS to determine if it should receive candidate status under the ESA (Edwards 2007). The Proposed Action would not directly affect Las Vegas buckwheat or its habitat, as the species and its potential and occupied habitats are outside the proposed project ROWs and construction areas.

Indirect effects on Las Vegas buckwheat could occur with an increase in noxious and invasive weed establishment and spread. Invasive grasses such as red brome are present throughout the area and may directly compete with Las Vegas buckwheat for resources as well as change the fire regime in the area. Increased nitrogen levels in the soil from deposition related to the operation of the proposed coal-fired plant may favor an increase in non-native weedy species, which may result in an increase fuel levels for wildfires. An increase in fire intensities and shortened fire-return intervals due to the presence of invasive grasses could lead to the mortality of Las Vegas buckwheat and conversion of its habitat to non-native grasslands. Impacts on this plant and its habitat would be avoided and decreased by implementation of mitigation and avoidance measures as described in Section 4.12.3.

Special status wildlife species most likely to be affected adversely by construction activities associated with the proposed rail line include the desert tortoise, Gila monster, western burrowing owl, desert bighorn sheep, Virgin River chub, and woundfin.

No direct impacts on the Virgin River chub and woundfin are expected from the proposed action. The USFWS determined that it was unlikely that effects on surface water flows in the Virgin River would result from groundwater extraction required for the proposed project from the carbonate aquifer in the Tule Desert hydrographic area would be detectable or measurable (USFWS 2003). That determination was based on information obtained in discussion with hydrologists from the National Park Service, Virgin Valley Water District, and USFWS Region 1 office, along with hydrological reports (CH2M Hill 2002a, 2002b; Dixon and Katzer 2002; Thomas 2002).

The use of surfactants within the proposed plant site to minimize dust from the coal-storage pile could potentially impact the Virgin River, the Virgin River chub, and the woundfin if the surfactant were to travel down Toquop Wash to the river. This impact is unlikely to occur, as the proposed project would be a zero-discharge facility and all runoff would be captured and treated on site. A Stormwater Pollution Prevention Plan (SWPPP) would be developed for the power plant site to assure that any runoff from the site is captured on site in a stormwater retention basin. The stormwater retention basin would be constructed with sufficient dimensions to accommodate runoff from impervious surfaces at the power plant site generated by the local maximum daily rainfall event with a return frequency of 100 years or less.

No breeding habitat for southwestern willow flycatcher, yellow-billed cuckoo, and Yuma clapper rail occurs within the project area. The closest potential habitat is located approximately 1 mile west of the proposed rail line and the nearest suitable nesting habitat is a minimum of 4 miles north of the project area, where mature cottonwoods, willows, and tamarisk gradually emerge (Map 3-11). These areas would not be disturbed by the proposed action.

Fencing would be installed where necessary to restrict livestock from entering the rail line ROW. Construction and use of the livestock fencing potentially could have indirect effects on desert bighorn habitat use and movement patterns. Desert bighorn are sensitive to disturbance and may avoid habitats

that are near the rail line when crews or trains are present. The fencing would be designed to allow bighorn sheep to cross the fence and would not be a barrier to bighorn movement (Appendix F).

Construction activities could affect and reduce habitat for the desert tortoise, Gila monster, and western burrowing owls. With regard to the desert tortoise, impacts from construction of the proposed coal-fired power plant, access road, water pipeline, and ancillary facilities are the same as those described in the No-Action Alternative; however, the increased size of the permanent area disturbed by the power plant (approximately 355 acres) would incrementally increase the effects from disturbance of desert tortoise habitat within this area. Construction of the rail line would affect an additional 698 acres of suitable habitat for the desert tortoise, with 356 acres being permanently disturbed. Impacts likely would be greatest in the northwestern portion of the project area because this area contains the highest densities of tortoise (greater than 5 tortoises per 100 acres) (JBR Environmental Consultants Inc. 2006).

The use of surfactants within the proposed plant site to minimize dust from the coal-storage pile could potentially impact desert tortoise if the surfactant were to blow off the site and come in contact with the tortoise forage plants. The effects of these surfactants if ingested by tortoises have not been studied. However, these impacts are unlikely to occur as the proposed passive-coal-storage pile where the surfactant would be applied is at a minimum distance of 700 feet from the outside of the proposed plant site, which would be fenced off with tortoise fencing. Additionally, the surfactant would be applied to the passive-coal-storage pile only after the pile was disturbed or after the surfactant had lost its effectiveness, so applications would likely only occur several times each year.

Operation of the proposed power plant would likely lead to increased levels of nitrogen and Hg deposition, albeit in low amounts, across some areas of desert tortoise habitat. Nitrogen deposition may aid in increasing noxious and invasive weed populations, some of which may serve as forage plants for tortoise when they are green. When dry, these same weeds may threaten desert tortoise habitat by modifying fire regimes. Desert tortoise may be impacted by Hg deposition due to their long life span, which may allow sufficient bioaccumulation of Hg to occur over time to impact their health. These impacts are likely to be minimal due to emissions controls for the power plant, low levels of emissions, and the low expected levels of deposition.

Total mercury deposition was modeled for a 40-km radius around the proposed plant. Modeled mercury deposition rates ranged from 1.0 E^{-6} to 1.2 E^{-5} $g/m^2/yr$ within the 40-km radius (ENSR 2007c). The highest deposition levels were found at two locations, both are approximately 3.25 miles from the power plant. The first location is west of the proposed plant in the East Mormon Mountains, and deposition rates for this area were 1.0 E^{-5} $g/m^2/yr$. The second area is northeast of the proposed plant and south of the Tule Springs Hills, where mercury deposition rates were modeled at 1.2 E^{-5} $g/m^2/yr$ (ENSR 2007c).

Mercury deposition from air emissions from the proposed plant has the potential to impact desert tortoise populations in the area. Mercury may be taken up by tortoises through plants that are consumed and through dust inhalation. Data indicating a link between disease and levels of mercury bioaccumulation in desert tortoise is lacking. However, Jacobson et al. (1991) found that tortoises with upper respiratory tract disease in the western Mojave Desert had levels of mercury in their livers approximately 11 times higher than those without the disease. Homer and Berry (2001) also found elevated but not toxic levels of mercury in desert tortoises. In general there is little information on mercury bioaccumulation in reptiles and no mortality of reptiles from heavy-metal intoxication has ever been reported, although ecotoxicological data for mercury in reptiles is lacking (Linder and Grillitsch 2000). The limited available data indicate that reptiles in general do not biomagnify heavy metals to an extent that would correspond to their trophic level (Linder and Grillitsch 2000). Nagy (2001) notes that the metabolic rate of reptiles results in much lower food requirements than birds and mammals. A 1-kilogram (kg) reptile would have dietary requirements of approximately 9 percent of a 1 kg bird of the same weight and 12 percent of a

1 kg mammal, resulting in lower levels of food consumption and thus mercury intake (Nagy 2001). Given the low levels of mercury deposition associated with the proposed plant, relatively low metabolic requirements of reptiles and thus decreased levels of mercury uptake, and limited biomagnification of heavy metals by reptiles, it is unlikely that the species would be impacted significantly by mercury deposition associated with the proposed power plant.

During the construction of the proposed rail line, an estimated 45 acres (30 acres of low density and 15 acres of moderate density) habitat for desert tortoise would be removed. These acreages are based on an estimate of the footprint of the rail bed; however, actual acreages may vary from those estimates depending on the final plan design of the rail line. No desert tortoise critical habitat would be affected by construction of the proposed rail line.

Tortoises may not be able to cross the rail lines, or may become trapped between rails. While individuals caught in between tracks are unlikely to be killed directly by the train (since estimated use of the railroad is one train per day), they would eventually die from starvation, dehydration, or exposure. This is a documented source of mortality for tortoises, as a total of eight carcasses were located between the rails along a 62-mile-long segment of rail lines in the eastern Mojave Desert (Boarman 2002). To avoid tortoise mortality from being trapped inside the rail line, it would be fenced with tortoise-proof fencing to prevent access. Since the fence could result in increased habitat fragmentation and act as a barrier to gene flow, a number of culverts and overpasses would be placed in strategic areas to promote access under or over the tracks. Assuming these measures are effectively applied, significant impacts to desert tortoise from implementation of the Proposed Action Alternative are not expected to occur.

The use of surfactants within the proposed plant site to minimize dust from the coal-storage pile could potentially impact the Virgin River and the Virgin River chub if the surfactant were to travel down Toquop Wash to the river. These impacts are very unlikely to occur, as the proposed project would be a zero-discharge facility and all runoff would be captured and treated on site. A SWPPP would be developed for the power plant site to assure that any runoff from the site is captured on site in a stormwater retention basin. The stormwater retention basin would be constructed with sufficient dimensions to accommodate runoff from impervious surfaces at the power plant site generated by the local maximum daily rainfall event with a return frequency of 100 years or less.

4.12.3.2 Mitigation

Vegetation

Recommended and prescribed mitigation measures for native vegetation communities under the Proposed Action Alternative include all measures discussed under the No-Action Alternative.

Removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g. using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.).

Reclamation normally would be accomplished with native seeds only. These would be representative of the indigenous species present in the adjacent habitat. Rationale for potential seeding with selected non-native species would be documented. Possible exceptions would include use of non-native species for a temporary cover crop to out-compete weeds. Where fires burn large acreages and seeding is required for erosion control, using all native species could be cost-prohibitive and not all species may be available. In all cases, seed mixes would be approved by BLM's authorized officer prior to planting.

Noxious Weeds and Invasive Species

Prior to project approval, a site-specific weed survey would occur and a weed risk assessment would be completed. Monitoring would be conducted for a period no shorter than the life of the permit or until bond release and monitoring reports are provided to BLM. If the spread of noxious weeds is noted, appropriated weed-control procedures would be determined in consultation with BLM personnel and would be in compliance with the appropriate BLM handbook sections and applicable laws and regulations. All weed-control efforts on BLM-administered lands would be in compliance with BLM Handbook H-9011, H-9011-1 Chemical Pest Control, H-9014 Use of Biological Control Agents of Pests on Public Lands, and H-9015 Integrated Pest Management. Should chemical methods be approved, the lessee must submit a pesticide-use proposal to the authorized officer 60 days prior to the planned application date. A pesticide application report must be submitted to the authorized officer by the end of the fiscal year following the chemical application.

Prior to the entry of vehicles and equipment to a project area, areas of concern would be identified and flagged in the field by a weed scientist or qualified biologist. The flagging would alert personnel or participants to avoid areas of concern. These sites would be recorded using GPS or other BLM Ely Field Office-approved equipment and provided to the Field Office Weed Coordinator or designated contact person.

Prior to entering public lands, the contractor, operator, or permit holder would provide information and training regarding noxious-weed management and identification to all personnel who would be affiliated with the implementation and maintenance phases of the project. The importance of preventing the spread of weeds to uninfested areas and the importance of controlling existing populations of weeds would be explained.

To eliminate the transport of vehicle-borne weed seeds, roots, or rhizomes, all vehicles and heavy equipment would be free of soil and debris capable of transporting weed propagules. This would include all vehicles and equipment used for the completion, maintenance, inspection, or monitoring of ground-disturbing activities, for emergency fire suppression, or for authorized off-road driving. All such vehicles and equipment would be cleaned with power or high-pressure equipment prior to entering or leaving the work site or project area. Vehicles used for emergency fire suppression would be cleaned as a part of check-in and demobilization procedures. Cleaning efforts would concentrate on tracks, feet, and tires, and on the undercarriage. Special emphasis would be applied to axels, frames, cross-members, motor mounts, steps (on and underneath), running boards, and front bumper/brush guard assemblies. Vehicle cabs would be swept out, and refuse would be disposed of in waste receptacles. Cleaning sites would be recorded using GPS or other equipment and provided to the BLM Field Office weed coordinator or designated contact person.

To eliminate the introduction of noxious weed seeds, roots, or rhizomes, all interim and final seed mixes, hay, straw, hay/straw, or other organic products used for reclamation or stabilization activities, feed, or bedding would be certified free of plant species listed on the Nevada noxious weed list or specifically identified by the BLM Ely Field Office.

To eliminate the introduction of noxious weed seeds, roots, or rhizomes, all source sites such as borrow pits, fill sources, or gravel pits used to supply inorganic materials used for construction, maintenance, or reclamation would be inspected and found to be free of plant species listed on the Nevada noxious weed list or specifically identified by the BLM Ely Field Office. Inspections would be conducted by a weed scientist or qualified biologist.

Mixing of herbicides and rinsing of herbicide containers and spray equipment would be conducted only in areas that are a safe distance from environmentally sensitive areas and points of entry to bodies of water (e.g., storm drains, irrigation ditches, streams, lakes, or wells).

Methods used to accomplish weed- and insect-control objectives would consider seasonal distribution of large wildlife species.

No noxious weeds would be allowed on the site at the time of reclamation release. Any noxious weeds that become established would be controlled.

Wildlife

Recommended and prescribed mitigation measures for wildlife under the Proposed Action Alternative include all measures discussed under the No-Action Alternative as well as the following:

- To avoid the potential for mortality and harassment of wildlife, all firearms and dogs would be prohibited at the project site(s).
- Intentional feeding of wildlife would be prohibited at the project site(s).
- Trash and food items would be disposed of promptly in predator-proof containers with resealable lids. Trash containers would be removed regularly (at least once per week). This effort would reduce the attractiveness of the area to opportunistic predators such as coyotes, kit foxes, and common ravens.
- A maximum speed limit of 15 miles per hour would be maintained while traveling on the construction site, on unpaved access roads, and in storage areas. This effort would reduce the potential for vehicle-wildlife collisions.
- Following construction, a selected number of access roads that are subject to public vehicle use would be closed. This effort would reduce the potential for mortality and general harassment of wildlife.
- Any fuel or hazardous waste leaks or spills would be contained immediately and cleaned up at the time of occurrence. Contaminated soil would be removed and disposed of at an appropriate facility.

Special Status Species

Recommended and prescribed mitigation measures for special status species under the Proposed Action Alternative include all measures discussed under the No-Action Alternative. Further measures are discussed below.

Prior to construction, comprehensive rare plant surveys would be conducted for all special status plant species that have been identified within the project area and those plants with the potential to occur in the project area. Surveys would be conducted within appropriate areas susceptible to surface disturbance by construction and/or operations and maintenance activities. Surveys of site-specific facility areas would be appropriately timed to cover the blooming periods of the special status plant species known to occur or with the potential to occur in the area. If an individual(s) is observed, an avoidance and impact-minimization plan would be developed and implemented in coordination with BLM and USFWS.

Where construction of the Proposed Action Alternative would remove Meadow Valley sandwort (along the banks of Toquop Wash in the Toquop Gap area), the Las Vegas buckwheat (northeast of the proposed power plant), and yucca and cacti species, the species would be salvaged and transplanted in an appropriate location in the project area. All actions would be coordinated with the BLM botanist.

Tortoise fencing would be installed along the entire length of the rail line and access road, and around the power plant site. The fencing would be constructed as described in the mitigation for the No-Action Alternative and shown in Appendix F. In areas along the rail line where I may be necessary to restrict livestock access to the rail line ROW, the tortoise fence would be heightened, as shown in Appendix F. The fence would be constructed to prevent livestock access, but not preclude bighorn sheep movement.

All identified populations of special status plants species would be avoided to the greatest extent possible. If avoidance is not possible, steps would be taken to remove and salvage populations prior to construction. Salvage would be conducted in a detailed reclamation plan approved by BLM.

Prior to and outside of the western burrowing owl breeding season (mid-March through August), any western burrowing owl burrows, holes, crevices, and cavities that would be graded for the project would be collapsed. All areas to be collapsed would be surveyed prior to grading to prevent burying of burrowing owls in burrows.

Any occupied owl burrows found during the breeding season would be avoided to assure that the nest and young are not abandoned. The nesting cycle takes a minimum of 74 days, during which construction on site must cease. Generally, eggs may be laid between mid-March and the end of May, and young may be present from mid-April through August.

Live Gila monsters found in harm's way on the construction site would be captured and then detained in a cool, shaded environment (less than 85 degrees Fahrenheit [ºF]) by the project biologist or equivalent personnel until a NDOW biologist could arrive for documentation purposes. Removal of a Gila monster requires authorization by NDOW. Although a Gila monster is venomous, its relatively slow gait allows it to be easily coaxed or lifted into an open bucket or box while carefully using a long-handled instrument such as a shovel or snake hook. (It is not the intent of NDOW to request unreasonable action to facilitate captures; additional coordination with NDOW would clarify logistical points). For safe containment, personnel may use a clean 5-gallon plastic bucket with a secure, vented lid; an 18-inch by 18-inch by 4-inch plastic sweater box with a secure, vented lid; or a tape-sealed cardboard box of similar dimension. Additionally, written information identifying the mapped capture location (e.g., GPS record), date, time, and circumstances (e.g., biological survey or construction) and habitat description (e.g., vegetation, slope, aspect, substrate) would also be provided to NDOW.

Injuries to Gila monsters may occur during excavation, blasting, road grading, or other construction activities. In the event a Gila monster is injured, it would be transferred to a veterinarian proficient in reptile medicine for evaluation of appropriate treatment. Rehabilitation or euthanasia expenses would not be covered by NDOW. However, NDOW would be notified immediately during normal business hours. If an animal is killed or found dead, the carcass would be immediately frozen and transferred to NDOW with a complete written description of the discovery and circumstances, habitat, and mapped location.

Either personnel from NDOW or other appropriately qualified onsite personnel may be requested to remove and release the Gila monster out of harm's way. Should NDOW not be immediately available to respond for photo-documentation, a 35- millimeter camera or equivalent (5 mega-pixel digital minimum preferred) would be used to take good-quality images of the Gila monster at location at the location of live encounter or dead salvage. The pictures, preferably in .tif or .jpg digital format would be provided to NDOW. Pictures would include the following information: (1) encounter location (landscape with Gila monster in clear view); (2) a clear overhead shot of the entire body with a ruler next to it for scale (the Gila monster should fill the camera's field of view and be in sharp focus); and (3) a clear, overhead closeup of the head (the head should fill the camera's field of view and be in sharp focus).

Any livestock fencing that occurs along the rail line would be designed to allow movement of desert bighorn sheep. An example of fencing design is included in Appendix F.

4.12.4 Summary of Impacts

Under either alternative, impacts on vegetation would include the removal of cover types and the potential for invasive and noxious weed establishment. Disturbance of vegetation cover types within the plant site would not be important, because the vegetation types that would be disturbed are common, have high frequencies of occurrence and have wide distributions. The extent of disturbance to these vegetation types would be expected to decrease with the onset of reclamation efforts on many of the disturbed areas.

The implementation of the No-Action Alternative or Proposed Action Alternative would result in direct loss of wildlife habitat from surface disturbance associated with the construction of the power plant and associated roads and facilities. The acreages of wildlife habitats disturbed for the No-Action Alternative and Proposed Action Alternative would be 963 and 1,661 acres, respectively, and the nature of impacts on these resources would be identical. The severity of these impacts would be expected to decrease with the completion of the construction phase of the project and with the onset of reclamation efforts on many of the disturbed areas. In addition, some wildlife species would be indirectly impacted by displacement from habitats in the vicinity of the project area due to the presence of human activities associated with the construction and operation of project facilities.

No impacts to special status plants are expected under the No-Action Alternative due to the lack of suitable habitat for these species within the project area. Adoption of mitigation procedures described in Sections 4.12.2.2 and 4.12.3.2 would assure that potential adverse impacts on the Meadow Valley sandwort and Las Vegas buckwheat under the Proposed Action Alternative would be avoided.

With regard to the desert tortoise, impacts on designated critical habitat from surface disturbance associated with construction of the power plant, access road, water pipeline, and ancillary facilities under both alternatives would generally be the same. Adoption of mitigation procedures described in Sections 4.12.2.2 and 4.12.3.2 would ensure that adverse impacts to the desert tortoise and other special status wildlife species under the No-Action Alternative and Proposed Action Alternative are avoided.

4.13 WILD HORSES AND BURROS

Within the Proposed-Action Alternative area, the BLM is currently managing the Blue Nose Peak Herd Management Area with an Appropriate Management Level for wild horses and burros of one; it is unlikely that the Proposed-Action Alternative would lead to any impacts on wild horses and burros.

4.14 ARCHAEOLOGY AND HISTORICAL PRESERVATION

4.14.1 Methods

Cultural resources have been assessed for their eligibility for inclusion in the NRHP of Historic Places (NRHP) using Criteria A through D of the National Historic Preservation Act. To be eligible for the NRHP, properties must be 50 years old (unless they have special significance) and have national, state, or local significance in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of four criteria:

Criterion A: Be associated with important historical events or trends

Criterion B: Be associated with important people

Criterion C: Have important characteristics of style, type, or have artistic value

Criterion D: Have yielded or have potential to yield important information

Assessment of the potential effects on the cultural environment was based primarily on criteria defined by regulations for *Protection of Historic Properties*, which implement the National Historic Preservation Act. Those regulations define an effect as a direct or indirect alteration to the characteristics of a historic property that qualify it for inclusion in the NRHP. Effects are adverse when the alterations would diminish the integrity of a property's location, setting, design, materials, workmanship, feeling, or association.

The area of potential effect (APE) for direct impacts, associated with construction and operational-related activities that would physically disturb a cultural resource, includes the No-Action Alternative and the Proposed Action Alternative power plant (640 acres) and 31-mile-long rail line corridor (752 acres). The APE for indirect and cumulative impacts, which includes changes to the visual setting of the area or increased opportunity for human disturbance, includes a 1-mile radius of the proposed power plant and rail line corridor (Maps 3-5 and 3-6).

Treatment of effects from the Proposed Action Alternative would be guided by the State Protocol Agreement between the BLM and Nevada State Historic Preservation Office (SHPO) (BLM 1990), which contains stipulations to ensure that historic and prehistoric properties eligible for the NRHP would be treated to avoid or mitigate project related effects to the extent practicable. No mitigation or avoidance is required for ineligible cultural resources sites or isolated artifacts.

Effects to NRHP eligible properties would be mitigated through the development and implementation of a historic properties treatment plan that would delineate measures to avoid, reduce, or mitigate those impacts. A comprehensive evaluation of effects on each property would be completed and additional mitigation identified as appropriate.

The State Protocol Agreement provides specific procedures for handling unanticipated discoveries during construction. BLM would assure that any human remains, grave goods, items of cultural patrimony, or sacred objects encountered during the undertaking are treated with respect and in accordance with the State Protocol Agreement and the Native American Graves Protection and Repatriation Act and its implementing regulations (43 Code of Federal Regulations [CFR] 10).

4.14.2 No-Action Alternative

4.14.2.1 Impacts

Additional cultural resource inventories have been conducted within the No-Action Alternative power plant site (640 acres) since the 2003 EIS. All of the new and previously identified cultural resources within the APE for direct impacts, associated with construction and operational-related activities that physically would disturb a cultural resource, have been evaluated in terms of their eligibility for listing in the NRHP.

Construction of the No-Action Alternative power plant would result in direct and indirect impacts on 19 cultural resources. Of these, seven cultural resources (prehistoric rock alignments) are recommended as NRHP-eligible and 12 are ineligible sites or isolated artifacts.

4.14.3 Treatment

Of the 19 cultural resources identified within the No-Action Alternative power plant site, effects on the seven prehistoric rock alignments recommended as NRHP-eligible would be addressed and mitigated through the development and implementation of a historic properties treatment plan that would delineate measures to avoid, reduce, or mitigate those impacts. Mitigation or avoidance would not be required for the 12 ineligible sites or isolated artifacts.

4.14.4 Proposed Action Alternative

4.14.4.1 Impacts

Construction of the Proposed Action Alternative power plant (640 acres) would result in direct and indirect impacts on 19 cultural resources, the same impacts as the No-Action Alternative. Of these, seven cultural resources (prehistoric rock alignments) are recommended as NRHP-eligible and 12 are ineligible sites or isolated artifacts.

Construction of the Proposed Action Alternative rail line corridor (698 acres, excluding the acres on the 640-acre power plant site) would result in direct and indirect impacts on 12 cultural resources. Of these, two are recommended as NRHP-eligible and 10 are ineligible sites or isolated artifacts.

In total, construction of the Proposed Action Alternative power plant and rail line corridor would result in direct and indirect impacts on 31 cultural resources. Of these, nine are recommended as NRHP-eligible and 22 are ineligible cultural resources. NRHP-eligible resources include seven prehistoric rock alignments associated with the power plant site and two historic resources, the Lone Tree Ranch irrigation ditch and Leith Siding, associated with the rail line.

Direct impacts were considered as construction and operational-related activities that physically would disturb a cultural resource. Direct construction disturbances may affect adversely the potential of six prehistoric rock features to yield important information to regional prehistory (Criterion D) and may adversely affect the contributing elements of the historic Lone Tree Ranch irrigation ditch, which embodies distinctive characteristics of the type, period, or method of its construction (Criterion C).

Indirect impacts were considered in the form of visual intrusions and increased opportunity for human activity in the area. Visual effects to the historic Leith Siding as a component of the railroad landscape would, in all likelihood, not affect the integrity of the property. Increased human activity in the area may include vandalism, theft, or unauthorized excavation, and would likely affect the integrity of one prehistoric rock alignment.

4.14.4.2 Mitigation

Of the 31 cultural resources identified within the Proposed Action Alternative power plant and rail line corridor, effects to nine cultural resources recommended as NRHP-eligible would be addressed and mitigated through the development and implementation of a historic properties treatment plan that would delineate measures to avoid, reduce, or mitigate those impacts. Mitigation or avoidance would not be required for the 22 ineligible sites or isolated artifacts.

Additionally, effects on archaeological and historic sites from increased visitation in the area would be mitigated through continued visitation by members of the BLM Site Stewardship Program. Members of the Nevada Archaeological Site Stewardship Program are actively monitoring archaeological sites in the Mormon Mountains and Tule Desert area.

4.14.5 Summary of Impacts

The construction of the No-Action Alternative power plant may have the potential to affect 19 cultural resources. Of these, seven cultural resources (prehistoric rock alignments) are recommended as NRHP-eligible and 12 are ineligible sites or isolated artifacts.

The construction of the Proposed Action Alternative power plant and rail line corridor may have the potential to affect 31 cultural resources. Of these, nine are recommended as NRHP-eligible and 22 are ineligible sites or isolated artifacts. NRHP-eligible resources include seven prehistoric rock alignments

associated with the power plant site and two historic resources, the Lone Tree Ranch irrigation ditch and Leith Siding, associated with the rail line corridor.

In accordance with the State Protocol Agreement, effects to NRHP eligible properties would be addressed through the development and implementation of a historic properties treatment plan that would delineate measures to avoid, reduce, or mitigate those impacts. Mitigation or avoidance would not be required for ineligible sites or isolated artifacts.

4.15 PUBLIC SAFETY, HAZARDOUS MATERIALS, AND SOLID WASTE

4.15.1 Methods

The proposed project potentially could have impacts from hazardous materials and environmental contamination. Handling, storage and disposal of hazardous materials, chemicals, substances, and wastes are governed by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1992. RCRA governs the generation, treatment, storage, and disposal of hazardous waste. Hazardous wastes are defined in 40 CFR parts 260 through 280. CERCLA controls cleanup of any release of hazardous substances to the environment. To meet the requirements of these acts, applicable pollution-control standards must be followed to prevent, control, and abate environmental pollution. The proposed project and resident facilities would be subject to these regulations. Pollution prevention at the proposed project is key to protecting the environment.

4.15.2 No-Action Alternative

4.15.2.1 Impacts

With the implementation of environmental controls outlined in the standard operating procedures for the No-Action Alternative, no environmental impacts related to hazardous and waste materials would be anticipated. A Spill Prevention Control and Countermeasures Plan (SPCCP) would be developed to provide procedures for cleaning up any future spill or release.

4.15.2.2 Mitigation

In the 2003 EIS, the measures below were identified to be implemented as part of the proposed project.

Contractors would be required to comply with Nevada state regulations established under the authority of the Federal Resources Conservation and Recovery Act of 1976.

As necessary, process-wastewater solid precipitant would be transported for disposal at a licensed landfill. Solid precipitant stored on site would be covered until transported off site for disposal.

Aboveground chemical tanks would be located within a containment structure that is paved and bermed and that is sufficient to contain a release from the largest tank within the area, plus sufficient freeboard to prevent overflow. Tanks would be registered, constructed, and managed using accepted engineering best practices, which may include high-level alarms or indicators to prevent overflow and locking valves. Tanks would be subject to a regular inspection regime.

The potential for adverse impacts from oil and fuel spills would be reduced through careful handling and designation of specific equipment repair and fuel storage areas.

Outdoor oil storage areas would be bermed with a capacity sufficient to contain the oil inventory in the single largest tank/equipment, plus sufficient freeboard to prevent overflow. These areas would be equipped with a normally locked valve. Regular inspections would determine if there had been a leak

requiring special attention. Otherwise, the valve would be opened to drain any rainwater to a plant oil/water separator. Any oil collected in the separator would be pumped out and removed by a licensed oil disposal contractor and disposed of in an approved treatment or disposal facility in accordance with Federal, state, and local regulations, standards, codes and laws.

Outdoor chemical and hazardous waste storage areas would be within diked containment areas. Chemicals and waste would be stored in accordance with the fire safety, hazardous materials management, and hazardous waste management standards of practice, which include segregation of incompatibles, protection of water-reactive materials from precipitation or moisture, adequate aisle space, etc.

Waste materials known or found to be hazardous would be disposed of in approved treatment or disposal facilities in accordance with Federal, state, and local regulations, standards, codes, and laws.

Solid waste would be stored in closed on-site roll-off bins. Recyclable materials would be separated from the solid-waste stream. Solid waste would be collected periodically and transported to a local licensed landfill.

Generation of waste during construction would be minimized through detailed estimating of materials needed and through efficient construction practices. Any wastes generated during construction would be recycled as much as feasible. Concrete waste would be used as fill on site, or, if not suitable for reuse, would be removed to a local licensed landfill. Any non-recyclable wastes would be collected and transported to a local licensed landfill.

Fuels, lubricant chemicals, and welding gases used during construction would be in controlled storage until used. Any empty containers or waste material would be segregated in storage and properly recycled or disposed of by licensed handlers.

Concrete trucks would not be washed at construction sites. All spilled concrete would be removed from construction areas and disposed of properly in an approved location or facility in accordance with Federal, state, and local regulations, standards, codes, and laws.

Portable toilets would be provided for on-site sewage handling during construction and would be pumped out and cleaned regularly by a licensed contractor. Sewage would be treated on the site during operation of the power plant.

A SPCCP would be put in place for project features and would include the following:

- Program components and assignments
- Professional engineer certification coordinator
- Site information
- Site drainage and stormwater management
- Emergency procedures/spill response
- Emergency reporting contacts
- Tank schematics
- Material safety data sheets
- Management approval
- Plans reviews and amendments
- Personnel training
- Reporting procedures/emergency reporting contacts
- Site inspections

- Notice to tank truck drivers
- Spill, fire, and safety equipment

Operators of the Toquop Energy Project would provide on-site fire and emergency medical equipment and services and would develop a police, fire, and medical-aid agreement with Lincoln County to provide additional personnel and services to the project site.

To minimize the exposure of personnel and equipment to potential flood hazards, construction activities in the washes would be scheduled to occur when the probability for flash flooding is minimal.

4.15.3 Proposed Action Alternative

4.15.3.1 Impacts

Potential wastes that could be generated at the site include domestic non-hazardous solid waste, hazardous wastes or materials, and used wastes that can be recycled. These types of substances, materials, and wastes would likely be present during stages of construction, development, and operation of the facility. During every stage, controls for managing, handling, and disposal of these wastes are necessary. Contractors who bring these types of materials onto the project site during construction, or vendors and facility operators who use and store these materials on site, would be responsible for meeting RCRA and CERCLA requirements.

Potential impacts on the environment could occur under the Proposed Action Alternative, resulting from improper handling, storage, transport, and/or disposal of hazardous chemicals, materials, or wastes at the proposed site. Several steps could be taken to mitigate the potential for this occurrence. The following paragraphs discuss these steps.

A SPCCP would be prepared for power plant operations, contractors, or vendors who distribute, use, or produce hazardous materials or wastes. Contractors or vendors could also prepare their own plans. These plans would provide the framework for responding to spills of products or wastes.

A SWPPP also would be prepared for railroad and plant operations, contractors, or vendors who distribute, use, or produce petroleum products, or other chemicals. A SWPPP includes best management practices for handling, storage, and transport of chemicals. These best management practices would be developed to mitigate the potential impacts of exposure of chemicals to stormwater in order to protect the environment. Contractors or vendors would also prepare their own SWPPPs, as appropriate.

Although there is the potential for environmental impacts resulting from the construction and operation of the Proposed Action Alternative, following the steps outlined above and in Section 4.15.2.2 would mitigate the potential impacts.

4.15.3.2 Mitigation

Mitigation would be the same as the No-Action Alternative.

4.15.4 Summary of Impacts

Under both alternatives, requiring the preparation and implementation of SPCCP and SWPPPs would mitigate potential environmental impacts. In addition, requiring operators, contractors, and vendors to follow and comply with RCRA, CERCLA, and other environmental regulations would mitigate potential environmental impacts.

4.16 SOCIOECONOMIC RESOURCES

4.16.1 Methods

For the impact assessment, the project is considered as a whole, rather than as separate components. This is partly because all project components are in the same geographic area and employees would be drawn from the same labor market areas. Wages, salaries, training, and other employment benefits would affect the employees regardless of which project component employed them. Revenue would flow from the project operations into the same government treasuries, regardless of which project component is the source of the revenue. The phases of the project and their durations are defined as follows:

Construction:	50 months
Operations:	50 years
Decommissioning:	2 years

The environmental consequences are presented for each phase of the project. The project would have various types of effects, which are presented below. Assumptions have been based on existing labor markets, unemployment rates, the number of people currently employed in the construction and utilities industries, and related projects that would demand similarly skilled workers. Assumptions also were derived from existing commuting patterns between counties in the regional area of influence.

The assumptions made for purposes of the impact assessment include the following:

- There would be no substantial changes in the technology to be used over the life of the project. Technologies used for power plant construction, power plant operations, and water delivery would be the same as described herein.
- The government legislation and regulations would remain largely the same as they are currently. Legislation and regulations of particular importance to the project address taxation, employment, water resources, and environmental conditions.

To determine impacts on the regional area of influence, data for current and proposed projects in the area were compiled and analyzed. Social and economic data, including population projections from various Federal, state, and local sources were used in this analysis.

4.16.2 No-Action Alternative

4.16.2.1 Impacts

The disposal of public land under the No-Action Alternative would result in the reduction of payment-in-lieu-of-taxes that BLM currently pays to Lincoln County on a per-acre basis. However, the construction and operation of the project would generate revenue through property and sales taxes that would be paid to the State of Nevada, which in turn would redistribute it to all counties. It is anticipated that Lincoln County would collect $14 million during the construction period, along with a portion generated from a certain percentage of the cumulative tax rate (BLM 2003a). While these jobs would benefit the area, they would not change the overall makeup of employment by industry in the region.

Construction Phase

Under the No-Action Alternative, temporary employees from the local labor force would be needed for construction of the gas plant and ancillary facilities. These employees would be based in communities within the regional area of influence and would be expected to commute to the location, thus reducing the possibility that there would be any increase in the population of cities and or counties near the construction site. Construction of the facility would last for 26 months, and an average of 500 skilled workers would be hired. During peak construction of the first phase, it is anticipated that there would be

1,200 to 1,500 temporary positions open for skilled workers. Construction crews would be carried over into the second phase of project construction. Under the No-Action Alternative, peak employment during construction would be 950 with an average of 500 workers.

Operations Phase

Under the No-Action Alternative, in the operations phase, there would be a total of 25 permanent positions (BLM 2003a). It is expected that potential employees would come from the local area of influence. Employment at the power plant would have a local multiplier effect, generating 25 more jobs. Of those 25 jobs, 10 would be indirectly tied to the power plant, resulting from employment at local establishments that would support the power plant, and the remaining 15 would be from induced employment. Induced employment would result from employee spending, which creates a demand for retail and similar jobs.

Shutdown Phase

During the decommissioning phase, there would be a loss of jobs. Because the lifespan of the project would be at least 40 years, there would be ample time for external agencies such as Lincoln County and the City of Mesquite, Nevada to formulate economic development planning that would serve to replace any jobs lost.

Population and Housing

Because the local area of influence is projecting continued population growth, local jurisdictions currently are working to develop plans that would accommodate projected growth. For all projects in the region, temporary housing facilities could be needed and the added population during construction could place a burden on local social and public services. It is anticipated that the Toquop Energy Project would acquire 25 percent of its construction workers from outside of the region, but all of the operations workers would be from within the region. Millions of dollars could potentially filter through to local businesses from the temporary increase in population due to construction workers (BLM 2003a).

4.16.2.2 Mitigation

Should temporary housing be needed for the proposed project, Toquop Energy would coordinate with local jurisdictions or agencies to determine housing needs and locations and identify additional mitigation, as needed.

4.16.3 Proposed Action Alternative

4.16.3.1 Impacts

Most of the impacts of the Proposed Action Alternative would be similar to those of the No-Action Alternative, except that economic impacts would be greater as a result of a work force four times larger than was estimated for the No-Action Alternative (110 permanent employees versus 25 permanent employees).

Construction Phase

Under the Proposed Action Alternative, it is anticipated that, over the approximately four-year construction period, more than 1,000 temporary positions would be created requiring skilled workers. The construction phase would comprise 50 months. There would be a combined workforce of direct labor, which would be actual construction labor, and indirect labor, which would consist of support services (e.g., commuter bus driver, flagmen, or administrative staff).

Time periods within the construction phase and the associated total workforce levels are shown in Table 4-7. Months 1 through 14 and 39 through 50 (25 total months) would have the lowest workforce levels at fewer than 200 workers. Months 15 through 20 and 37 through 38 (9 total months) would have a workforce varying between 200 and 600 workers. Months 21 through 36 (16 total months) would have a workforce of more than 600 workers with a peak workforce of 1,100 in Month 29.

Table 4-7
Total Workforce Levels

Month	Number of Workers	Total Months
1 - 14	Fewer than 200	14
15 - 20	200-600 workers	7
21 - 36	Over 600 Workers (peak of 1,100 in Month 29)	16
37 - 38	200-600 workers	2
39 – 50	Fewer than 200	11

SOURCE: Toquop Energy Company, LLC 2006b

Considering that other employment opportunities in the local area of influence would compete for the same job candidates and that specialized skills would be necessary for certain aspects of the project's construction, the project would draw from the entire region of influence.

The incomes of all construction workers at the project would result in direct effects upon the area's economy. Additional income effects upon the region would occur as the result of purchases of goods and services to support the project. Finally, workers would spend their wages in the local economy and purchase additional goods and services; these purchases would constitute induced effects on the local economy.

The construction-phase employment effect on the local area of influence would include the creation of a workplace that for a period of two years would be the largest employer in Lincoln County. The plant's construction operation also would slightly exceed the employment of any one establishment in Mesquite (in Clark County), although two of the casinos in Mesquite have nearly 1,000 employees.

There would be an overlap between the skills required for construction jobs at the project and those required for utility jobs in the area. An example would be the skills of various types of equipment operators. Therefore, certain other employers in the area would compete for the same applicants, as would the project.

Population. Few employees would be expected to move into the area on other than a temporary basis during the construction phase. Therefore, there would be a negligible effect on the permanent resident population or the housing inventory in the local area of influence.

Economy and Employment. There would be induced economic effects from all the construction workers, whether or not they reside in the local area of influence. Those not from the local area of influence, however, may return to their permanent homes on weekends, so they would spend a smaller proportion of their incomes in the local area than the local residents.

Housing. Construction workers from the local area of influence generally would be expected to continue to reside in their current homes. There would be no onsite housing facilities at the power plant site. If construction workers from outside of the area of influence require temporary housing, Toquop Energy would coordinate efforts with the local jurisdiction to identify appropriate locations and obtain any necessary permits or land use approvals. A park-and-ride program would be developed to transport

construction workers from the motor homes to the construction site. Toquop Energy would work with the city of Mesquite and local businesses to accommodate and support offsite employee parking.

Public Facilities and Services

Local Utility Service. There is a possibility that additional increases in the population of the workforce from outside of the areas of influence could burden the local utility services. However, because few employees would move into the area on other than a transient basis for the construction phase, it is not anticipated that there would be an adverse effect on the local utility service.

Education and Training. Most employees of the construction phase likely would be from the local area of influence with children already attending schools in the local school districts. If employees come from outside of the region, however, the added number of children would impact the school system. Because of projected population growth, districts within the local area of influence have been developing plans for expansion and analyzing potential sites to build new facilities. It is anticipated that money paid through state and local taxes from the developers of the proposed project, as well as developers from other projects, would be redistributed to counties, contributing to education funding.

Health Conditions and Health Care. Adverse effects on health-care facilities during the construction phase are not anticipated, as most workers would be from the local area of influence. Construction workers from outside of the area, however, could bring additional family members, which could potentially contribute to burdens on the health-care system. Currently, medical facilities within the local area of influence are anticipating projected growth and are developing plans to expand their services.

Public Safety. Currently, the Lincoln County Sheriff's Department provides services throughout the Toquop area. The response time to the Toquop area is 2 hours, which could pose a concern to employees working at the proposed project site should emergency medical services be required.

Operations Phase

There would be a total of 110 permanent employees at the power plant throughout the entire operations phase. This is more than four times the number of permanent employees that would be needed for the No-Action Alternative. Nearly all of the employees would be based at the power plant site. A few would provide support to both the power plant and ancillary facilities.

Population. Most potential employees probably would be from the local area of influence. Highly specialized workers most likely would be from outside the area and could bring additional family members. A substantial increase in population, however, is not expected as a result of permanent employment for the proposed project.

Economy and Employment. Due to the high number of operations-phase jobs, the power plant would rank in the top five largest private employers in Lincoln County. The stability of employment levels over a period of 50 years would be important to the stability of the region. Some of the establishments and entire industries represented in the current employment distribution in the area are not traditionally as stable.

The wages for workers at the project would be similar to those at existing power plants just outside of the regional area of influence. The wage scale would be somewhat higher than for construction-phase jobs.

Housing. Because most of the workers are expected to come from Mesquite or the local area of influence, it is not anticipated that housing would represent an significant incremental demand in the area. Potential employees coming from outside of the areas of influence with highly specialized skills would have a higher pay and would likely be able to afford housing within the local area of influence. To accommodate

future growth, master-planned communities are already being planned and developed within the local area of influence, including the Riverside planned unit development and the Mesquite contiguity parcel in Mesquite, the Coyote Springs development, and the Hidden Valley Community project.

Public Facilities and Services

Local Utility Service. There is a possibility that additional increases in the population of the workforce from outside of the areas of influence could contribute to burdens on local utility services. Local utility companies, specifically those in Lincoln County, are planning to expand their services to accommodate future growth in the region by buying supplemental power from larger energy facilities. Telecommunication companies also are finding ways to accommodate that growth and have plans in place for expansion.

Education and Training. If potential employees come from outside of the region, the added number of children could impact the school system. Because of projected population growth, districts within the local area of influence have been developing plans for expansion and analyzing potential sites to build new facilities. It is anticipated that money paid through state and local taxes from the developers of the proposed project, as well as developers from other projects, would be redistributed to counties, contributing to education funding.

Health Conditions and Health Care. Highly specialized workers would most likely be from outside of the area and would bring additional family members, which potentially could burden the health-care system. Currently, medical facilities within the local area of influence are anticipating continued population growth and are developing plans to expand their services.

Public Safety. Currently, the Lincoln County Sheriff's Department provides services throughout the Toquop area. The response time to the Toquop area is 2 hours, which could pose a concern to employees working at the proposed project site. Projected needs for the Toquop area over the next 5 to 10 years include creating 6 patrol positions and 2.5 deputies per 1,000 individuals (Lincoln County 2006). Lincoln County also would provide fire department startup facilities specifically for the Toquop Township area.

Decommissioning Phase

During the decommissioning phase, there would be a loss of high-paying jobs. Because the lifespan of the project is known, there would be ample time for external agencies such as Lincoln County and the city of Mesquite to formulate economic development planning that would serve to replace any jobs lost.

4.16.3.2 Mitigation

Short-term mitigation measures would involve Toquop Energy coordinating with local jurisdictions and agencies to determine housing needs and locations should temporary housing be needed for the proposed project during the construction phase. In order to mitigate concerns with public safety, Toquop Energy would work with local jurisdictions to address how best to serve employees at the project site in case emergency medical service is required. .

4.16.4 Summary of Impacts

For both the No-Action and Proposed Action Alternatives, impacts during the construction phase would be temporary and are not anticipated to adversely affect populations of both the local and regional areas of influence. Construction workers most likely would come from the local area of influence and already would have homes in the community. However, local economies might benefit from workers coming from outside of the regional area of influence to meet the high personnel demands of construction. Workers would spend their wages in the local economy and purchase additional goods and services, inducing additional positive effects on local economies.

During the operations phase under both alternatives, there potentially could be employees from outside of the areas of influence that command higher pay for their specialized skills. It is expected that these employees would not find difficulty purchasing affordable homes due to their higher salaries. These employees, however, could add to burdens on public facilities and services. Additional family members of these employees also may burden local school districts. There would be positive induced effects on the local economies, however, as these employees would purchase goods and services thereby increasing sales and overall consumer spending. Higher response times for emergency services are a consideration during both the construction and operation phases, should any incidents occur at the proposed project site. To mitigate this concern, Toquop Energy would coordinate a strategy for emergency response services with local jurisdictions. Toquop Energy also would be required to coordinate with the appropriate local jurisdiction on land use approvals in the event that temporary housing is needed during the construction phase.

4.17 ENVIRONMENTAL JUSTICE

4.17.1 Methods

Information about the proportion of population that may be impacted by the alternatives and are characterized as minority and/or low-income is provided in Section 3.18. Overall, the data show that there is a slightly higher proportion of Hispanic residents in Mesquite, Nevada, and there are higher proportions of low-income populations in Caliente, Lincoln County and St, George, Utah. The potential for disproportionate, adverse impacts on the identified environmental justice populations was evaluated.

4.17.2 No-Action Alternative

4.17.2.1 Impacts

Income and revenue benefits associated with the project would be distributed throughout all areas, including environmental justice populations. Adverse impacts associated with the project would not be experienced disproportionately by an environmental justice population.

There are no special issues, such as housing, transportation access, or resource use in the project area that would affect the environmental justice population disproportionately.

4.17.2.2 Mitigation

Mitigation would not be required.

4.17.3 Proposed Action Alternative

4.17.3.1 Impacts

A key difference between the Proposed Action and No-Action alternatives would be the addition of a rail line. Caliente, as a potential employee resource pool, is much closer to Leith Siding than the power plant site. If the construction or operational employees were to report to work at the Leith Siding area, an employment opportunity for Caliente residents at that location would be more attractive than one at the power plant site.

As with the No-Action Alternative, adverse impacts associated with the project would not be experienced disproportionately by an environmental justice population, and no special issues were identified.

4.17.3.2 Mitigation

Mitigation would not be required.

4.17.4 Summary of Impacts

No disproportionate, adverse impacts on environmental justice populations would occur as a result of the construction and operation of any of the alternatives.

4.18 CUMULATIVE IMPACTS

4.18.1 Introduction

Regulations prepared by the Council on Environmental Quality (CEQ) for implementing NEPA require Federal agencies to analyze and disclose effects that could result from the incremental effect of an action "when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

This section addresses potential cumulative impacts that would result from the effects of the No-Action or Proposed Action alternatives when combined with the effects of other past, present, and reasonably foreseeable future projects. Interrelated projects, defined as those activities that could interact with the alternatives in a manner that would result in cumulative impacts, are noted in Table 4-8.

Table 4-8
Summary of Past, Present, and Future Actions

Activities	Location/Description	Status
UTILITIES, INDUSTRY AND PUBLIC SERVICE		
Reid Gardner station	Moapa, Nevada. 590-megawatt (MW) generating station consisting of four coal-fired steam boilers	existing
Reid Gardner expansion	Clark County, south of Moapa, Nevada. Approximately 240 acres for evaporation ponds and 320-acre expansion site for permanent storage yard for fly ash	future
Chuck Lenzie generating station	Apex, Clark County (about 20 miles northeast of Las Vegas). 1,200-MW combined-cycle power plant	existing
Southwest Intertie project	500-kilovolt project passing north/south approximately 40 miles west of the project site	future
Kern River Gas Transmission Company expansion pipeline	36-inch-diameter natural gas pipeline that crosses southeast corner of proposed plant site.	existing
Holly Energy Partners	12-inch-diameter pipeline extending approximately 400 miles from Salt Lake City, Utah, to the northern edge of Las Vegas, Nevada	future
White Pine Energy	White Pine County, Nevada. 1,500-MW coal-fired generating plant	future
Ely Energy Center project	White Pine County, Nevada. 2,500-MW coal-fired generating plant	future
Ash Grove cement plant	Moapa Indian Reservation. Cement kiln	future (2010)
Mesquite Airport	Mesquite, Nevada. General aviation replacement airport	future (2015)
Exit 109 Interchange	Mesquite, Nevada. Development of a "Change in Control of Access Report" for the proposed Interstate 15 at Exit 109 Interchange to serve new airport, developments, and Toquop Energy Project	future
Mesquite wastewater treatment plant expansion	Expansion of the existing wastewater treatment plant to 6.0 millions gallons per day	future (2007)
BLM MANAGEMENT ACTIVITIES		
Grazing	Grazing activities and range improvements throughout project area	past, existing, future

Activities	Location/Description	Status
Mining	Authorization of mining claims in project area	past, existing
Lincoln County Conservation Recreation and Development Act	Sale of up to 90,000 acres in Lincoln County as provided for by the Lincoln County Conservation Recreation and Development Act	future
Proposed Meadow Valley Wash Area of Critical Environmental Concern (ACEC)	This ACEC is included under the preferred alternative in the Draft Resource Management Plan for the Ely Field Office (under revision). The ACEC would be located along the Union Pacific Railroad and would be crossed by the proposed rail line for approximately 3 miles (near Leith Siding)	future
Yucca Mountain Rail	Department of Energy. Caliente alignment is approximate 50 miles north west of the proposed plant site	future
WATER DEVELOPMENT		
Kane Springs Valley water development project	Proposed by the Lincoln County Water District, would establish a production and distribution system to deliver water to planned developments	future
Lincoln County Land Act groundwater development project	The Lincoln County Water District proposes to construct groundwater facilities and ancillary utility infrastructure designed to pump and convey groundwater in the Clover Valley and Tule Desert Hydrographic Basins, primarily to meet future municipal needs in southeastern Lincoln County	future
Southern Nevada Water Authority, Vidler, Lincoln County Water District and interrelated water projects	Interrelated water projects concerning deep and shallow aquifer developments and pipelines in and through Lincoln and Clark counties	future
Virgin and Muddy rivers surface water development project	Southern Nevada Water Authority is proposing to build facilities to divert, treat and transmit its existing surface water rights on the Virgin and Muddy Rivers to the Las Vegas Valley. The proposed facilities would divert an annual average of approximately 71,000 acre-feet of water from the Virgin River and up to 11,000 acre-feet per year from the Muddy River.	future (2013)
RESIDENTIAL		
Riverside planned unit development	1,400 acres located east of Riverside Road (at I-15 exit 112) with future residential development programmed not to exceed 4,200 dwelling units. Commercial uses and public facilities would be integrated with the proposed residential.	future
Lincoln County Land Act (LCLA)	The LCLA identified for sale approximately 13,500 acres in the southeastern corner of Lincoln County near Mesquite, Nevada. It is likely that residential development will occur.	existing
Mesquite contiguity parcel	Upon approval of the Mesquite Airport EIS, a 5,080-acre parcel will be released to the City of Mesquite for development. The parcel is located next to the proposed Mesquite Replacement Airport.	future
Coyote Springs development	Planned community about 50 miles north of Las Vegas and 50 miles west of project site. Includes approximately 42,800 acres east of U.S. Highway 93 and north of State Route 168	future
Hidden Valley Community project	Moapa, Nevada. Hidden Valley Glendale LLC's proposed 910-acre Hidden Valley Community project	future
Rural and suburban residential development	Throughout project area (Mesquite and Las Vegas, Nevada)	existing, future
ENVIRONMENTAL CONDITIONS		
Drought	Nevada, like much of the desert Southwest is experiencing drought conditions	past, existing

Activities	Location/Description	Status
Meadow Valley Wash flooding 2005	Repairs along the Union Pacific Railroad at Leith Siding in Meadow Valley Wash as a result of the 2005 flooding events	present (ongoing)
Wildland fire	Areas adjacent to existing and proposed rail lines, especially in those areas that become populated by weeds	past, present, future

4.18.2 Methods

It is important to note that cumulative impacts consider the *resource* "footprint" or area of influence or effect, rather than the *project* footprint. For example, air quality is likely to have a very large area of influence, while distribution of an endangered plant species may have a very small area of effect (footprint). Therefore, the geography represented by the projects noted in Table 4-8 is broad. Additionally, Council on Environmental Quality guidance on the assessment of cumulative impacts indicates that the analysis should consider issues identified during scoping. During scoping for this EIS, air quality and water resources received the highest level of public concern. Projects outside the area of immediate, local influence but within the sphere of effect for air and water quality have been identified to facilitate adequate analysis of cumulative impacts to those resources.

In some instances, available data are sufficient to provide a quantitative assessment of impacts. For some resources, impacts are discussed qualitatively. In addition, not all of the past, present, and future actions identified in Table 4-8 would interact with all resources.

4.18.3 Cumulative Impact Analysis

Cumulative effects are characterized below by resource or resource use, as appropriate. Each discussion specifies the additive or synergistic effects that the alternatives might have in combination with past, present, and reasonably foreseeable future actions as identified in Table 4-8.

4.18.3.1 Lands

Future projects in the region—including residential development, airport expansion, and transportation improvements—combined with each of the alternatives would have the cumulative effect of further urbanizing some areas of southeastern Lincoln County. Although the Lincoln County Land Act parcels are expected to develop into residential areas over the long term, potential land use incompatibilities with the industrial Toquop Energy Project would be minimal due to distance between the uses and the opportunity for land use developers to account for this interface as master plans are developed. Additionally, although there are several proposed power projects in the region both to the north and south of the Toquop Energy Project, cumulative effects on land use patterns would be minor as the facilities would be distant from each other and the opportunity exists for future transmission line interconnections to be constructed within established corridors (such as the Southwest Intertie Project corridor, located about 40 miles west of the proposed power plant site).

4.18.3.2 Grazing and Rangeland

Past actions in the southeastern Lincoln County have resulted in a reduction in grazing authorizations due to implementation of BLM's desert tortoise management plans and the land ownership shifts associated with Lincoln County Land Act. Reductions in authorized AUMs also have occurred as a result of drought conditions and actions taken to meet the public-land health standards for rangeland. Future water development projects in the area could result in competition between agricultural and residential water uses because some grazing allotments are tied to water-based rights. The impacts on grazing and livestock that would result from the alternatives would have a small but incremental effect on the regional area of influence. As more lands are converted to industrial use, the character of the area will be reshaped, which could decrease the viability of agricultural uses. However, because Lincoln County is 98 percent public land, ample opportunities would continue to exist for grazing.

4.18.3.3 Recreation and Access

Projected population growth in Las Vegas and Mesquite, growth expected to occur in association with the Riverside Planned Unit Development and Lincoln County Land Act, and recreational pursuits by the project workers could all increase public interest in available open space and recreation areas. Development around the Las Vegas area could push recreation further north into southern Lincoln County. However, the presence of the proposed project, including ancillary facilities and rail line, would not diminish the areas available for recreation. Road development projects in the area and the creation of a new linear route (the rail line) could increase public access in the area. However, most of the routes, trails, and roads in the project area were created for grazing and ranching purposes, and additional access would not be expected to impact the existing transportation network. No cumulative impacts are anticipated to recreation or access.

4.18.3.4 Wilderness and Special Management Areas

Wilderness and special management areas such as ACECs could experience cumulative impacts as population increases and as more people seek solitude and recreational opportunities in the area, increasing pressure on sensitive resources.

The BLM is considering the designation of a Meadow Valley Wash ACEC. It is anticipated that this area would be managed as a ROW avoidance area. Under the Proposed Action Alternative, the rail line would cross the proposed ACEC for approximately 5 miles. Resources within the proposed ACEC have already been impacted by past fire damage and flooding.

4.18.3.5 Visual Resources

The project alternatives would introduce a new industrial facility to the overall landscape, which is primarily undeveloped. However, in combination with other future actions, the additive impact on potential sensitive viewers would be limited due to constrained opportunities for the project to be viewed, the distances from which viewers would be able to see the project, visual interference with the project views by topography, and the presence of existing transmission facilities.

4.18.3.6 Climate and Air Quality

Further residential and commercial development is expected to occur in the general area of the Toquop Energy Project. Emissions due to construction activities are frequently near-ground releases and, therefore, the impacts would occur only over a limited geographic area within the immediate vicinity of the proposed facility. Reid Gardner Station is an existing 590-MW coal-fired power plant in the region. Two proposed power plant projects include the White Pine Project (1,500-MW coal-fired generating plant in White Pine County, Nevada) and Ely Energy Center Project (2,500-MW coal-fired generating plant in White Pine County, Nevada). These development projects would not likely occur at the same time or in the same area as the proposed Toquop Energy Project. Furthermore, since the air quality impacts during construction would occur over a limited geographic area for each project, the cumulative effects during construction would be limited.

In the context of the Prevention of Significant Deterioration (PSD) permitting requirements, a PSD increment evaluation and NAAQS Evaluation were conducted to assess potential cumulative impacts on air quality. The PSD increment evaluation is used to estimate the degradation of air quality caused by construction of manmade sources of air pollution after certain baseline dates. The NAAQS evaluation, which includes background pollutant concentrations, is used to estimate the total impacts of all natural and anthropogenic sources of air pollution on air quality as compared to the pollutant concentrations at which human health or the environment could be impacted.

Table 4-9 is a list of the permitted major sources included by ENSR in the PSD cumulative impact analysis.

Table 4-9
Background Sources Included in the Cumulative Modeling Analysis

Facility Name	Facility Type	Location
Royal Cement Company	Cement plant	Logandale, Nevada
Nevada Power Company Reid Gardner Station	Coal-fired electric generating station	Moapa, Nevada
Western Mining and Materials	Crushing and screening plant	Black Rock, Arizona
Simplot Silica Products	Silica sand production	Overton, Nevada
Casablanca/Oasis Casino	Hotel and casino	Mesquite, Nevada
Rinker Materials Moapa Facility	Cement plant	Moapa, Nevada
Precision Aggregates	Sand and gravel yard	Mesquite, Nevada
Lasco Bathware	Plumbing products manufacturer	Moapa, Nevada
Legacy Rock	Sand and gravel yard	Logandale, Nevada
BLM Moapa Decorative Rock Pit	Sand and gravel yard	Logandale, Nevada
Sunroc Corp Bunkerville Ready Mix	Cement plant	Bunkerville, Nevada
Ready Mix, Inc.	Cement plant	Las Vegas, Nevada
Geneva Pipe of Nevada	Concrete pipe manufacturer	Moapa, Nevada
General Rock Products	Sand and gravel yard	Las Vegas, Nevada

SOURCE: ENSR Corporation 2007a

The PSD Class I modeling results indicate that the proposed project has insignificant impacts. However, since certain pollutants exceeded the SILs within Class II areas, a cumulative PSD Class II increment evaluation and NAAQS evaluation for SO_2 (3-hour), PM_{10} (24-hour and annual), and NO_2 (annual) were performed using project sources with the main boiler at 100 percent load and the appropriate inventory of background sources. Table 4-10 summarizes the PSD Class II increment cumulative modeling analysis for the Virgin River hydrographic basin, which is where the Toquop Energy Project is located. The results of the PSD increment evaluation, presented in Table 4-10, show that the emissions from the proposed project plus those from other PSD-increment-consuming sources would not exceed a PSD Class II increment. The largest percentage of the increment was for annual NO_2 at 50 percent, located 0.6 km (0.4 mile) from the stack.

Table 4-11 presents the results of the NAAQS analysis. For all three pollutants the reasonable, but conservative, impact is shown to be less than the NAAQS. The potential effects on air quality due to emissions from the proposed Toquop Energy Project, in conjunction with nearby source emissions, are expected to result in predicted concentrations in Class II areas that are in compliance with NAAQS limits, as shown in Table 4-11. The largest percentage of the NAAQS was for annual PM_{10} at 61 percent located 0.6 km (0.4 mile) from the stack. The only two reasonably foreseeable actions potentially impacting air quality in the vicinity of the proposed alternative are the White Pine and Ely Energy Center projects. However, both of these projects are to be located near Ely, White Pine County, Nevada, which is located more than 225 km (140 miles) from Toquop Energy Project. The emissions from these two plants would be relatively similar to that of the Toquop Energy Project on a unit-of-power basis. Because the modeled impacts for this analysis occur very near the Toquop Energy Project stack and are well below the PSD Class II increment and NAAQS, it is estimated that the combined impacts would not be expected to exceed the PSD increment and NAAQS.

Table 4-10
PSD Increment Cumulative Modeling Analysis – Main Receptor Grid

Pollutant	Averaging Period	Modeled Impact ($\mu g/m^3$)	Distance	Bearing (Deg.)	PSD Class II Increment ($\mu g/m^3$)	Percent of Increment
Sulfur dioxide (SO_2)	3-hour [1]	29.27	16.7 mi (26.9 km)	222	512	6
PM_{10}	24-hour [1]	12.70	0.4 mi (0.6 km)	195	30	42
	Annual [2]	3.89	0.4 mi (0.6 km)	193	17	23
Nitrogen dioxide (NO_2)	Annual [2]	12.39	0.4 mi (0.6 km)	195	25	50

SOURCE: ENSR Corporation 2007a
NOTES: $\mu g/m^3$ = micrograms per cubic meter
Deg. = degree
PSD = Prevention of Significant Deterioration
PM_{10} = particulate matter less than or equal to 10 microns
mi = mile
km = kilometer
[1] Modeled impact reflects the highest second highest concentration.
[2] Modeled impact reflects the highest first highest concentration.

Table 4-11
Proposed Project NAAQS Cumulative Modeling Analysis – Main Receptor Grid

Pollutant	Averaging Period	Maximum Modeled Conc. ($\mu g/m^3$)	Ambient Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Distance km (mi)	Bearing (Deg.)	NAAQS ($\mu g/m^3$)	Percent of Ambient Standard
Sulfur dioxide (SO_2)	3-hour [1]	29.27	28.0	57.27	16.7 mi (26.9 km)	222	1,300	4
PM_{10}	24-hour [1]	12.70	37.1	49.78	0.4 mi (0.6 km)	195	150	33
	Annual [2]	3.89	26.6	30.49	0.4 mi (0.6 km)	193	Revoked	NA
Nitrogen dioxide (NO_2)	Annual [2]	12.39	8.5	20.89	0.4 mi (0.6 km)	195	100	21

SOURCE: ENSR Corporation 2007a
NOTES: : $\mu g/m^3$ = micrograms per cubic meter
Deg. = degree
NAAQS = National Ambient Air Quality Standards
PM_{10} = particulate matter less than or equal to 10 microns
NA = Not available
[1] Modeled impact reflects the highest second highest concentration.
[2] Modeled impact reflects the highest first highest concentration.

There is one other coal-fired power plant in the region shown on Map 4-1, the Reid Gardner Station in Moapa. This power plant emits about 145 pounds of mercury annually (Clean Air Task Force 2000). The largest source of atmospheric mercury in Nevada is processing gold through precious metal mine operations (NDEP 2007a). In 2006, mining facilities regulated through the Nevada Mercury Control Program reported a total of 4,593 pounds of mercury and 130 pounds of mercury co-product emitted throughout Nevada (NDEP 2007b).

Regulatory changes to reduce mercury emissions have been implemented within the last several years that would be expected to reduce overall emissions to the existing environment. In March 2006, Nevada adopted the Nevada Mercury Air Emissions Control Program, which requires mercury emissions controls at precious metal mining facilities. Voluntary mercury reduction efforts at mining facilities have been occurring since 2002; an 82 percent reduction in mercury emissions was observed through 2004 at the participating mining facilities in this program (NDEP 2007a). In addition, the Clean Air Mercury Rule

(CAMR) applies to coal-fired power plants, as described in Chapter 3. Nevada's CAMR program was initiated in September 2006 and requires new coal-fired units to obtain a mercury operating permit, and encourages reductions at existing facilities. Nevada is responsible for ensuring that the state stays within its mercury emissions "budget" set under CAMR.

Global Air Quality Impacts

As described above, the proposed power plant would emit criteria pollutants, including particulates and gaseous pollutants (SO_2 and NO_x) that form aerosols in the atmosphere. Although measurable concentrations of emissions from the proposed power plant would likely extend no further than 62 miles (100 km) from the facility, due to regional wind patterns, minute quantities of these chemicals could eventually be dispersed across a wider area. In addition, combustion of biomass and all fossil fuels (coal, coke, petroleum, and natural gas) and lime-based flue-gas desulfurization (FGD) processes result in emissions of carbon dioxide (CO_2). CO_2 is widely considered to be a "greenhouse gas." Greenhouse gases, which also include methane, NO_x, chlorofluorocarbons, and other chemicals, play a natural role in maintaining the temperature of the earth's atmosphere by allowing some sunlight to pass through and heat the surface of the earth and then absorbing a portion of the infrared heat reflected or transmitted from the ground. Natural sources of greenhouse gases include volcanic eruptions, plant respiration, and decomposition of organic matter.

Global temperatures have increased in the last 50 years. This phenomenon is referred to as "global warming." Increased emissions of greenhouse gases from anthropogenic (i.e., human) activity over the last 100 years are suspected of playing a role in the observed global warming, although the precise mechanisms and magnitude of their effect remains subject to debate within the scientific community. However, there currently is broad consensus within those members of the scientific community who have researched this issue that greenhouse-gas emissions associated with such anthropogenic activity has contributed to the observed global-warming phenomenon.

The electric power generating industry is participating in extensive research on further defining the extent to which emissions of anthropogenic greenhouse gas contributes to global warming. In addition, technological approaches to reducing greenhouse gas emissions from industrial facilities are the subject of numerous research projects around the world. The Edison Electric Institute has called for increased international cooperation with regard to research and technology development (Edison Electric Institute 2006). One possible means to reduce atmospheric emissions of CO_2 is to compress and inject it deep underground; however, this technology, and the means to concentrate CO_2 in a gasification process, is in the experimental stage.

4.18.3.7 Geology, Soils, and Minerals

Cumulative impacts on soils would include the damage to biological soil crusts in the project area and other areas in the region where construction or surface-disturbing activities, such as those noted in Table 4-8, disturb large acreages of the sensitive desert environment and impact the fragile soil crust. Cumulative impacts on biological soil crusts would be localized and difficult to predict without a survey identifying specific locations. The construction of an improved road may stimulate the development and production of mineral resources, particularly mineral materials, to meet the increasing demands of the southern Nevada markets.

4.18.3.8 Groundwater Resources

Although there have been several other power-generation plants developed in the region in the past 40 years, they draw their groundwater from outside the Tule Desert or Clover Valley fractured-rock or basin-fill aquifers. Basin recharge may have been affected by seven years of drought that may continue for another several years.

There are currently two other power plant projects in development in the region that may be constructed within the next eight years—the Ely Energy Center, White Pine, and Toquop power plants. They would not be drawing groundwater from the Tule Desert or Clover Valley hydrographic basins; therefore, there would be no additive impacts on those groundwater sources from the other proposed power plants. A population boom in several small Lincoln County communities, as well as the availability of up to 103,500 acres of land for sale in Lincoln County, suggests that the demand for groundwater will be increasing over the next 5 to 10 years, which likely will be met (partially or entirely) with water from the Tule Desert and Clover Valley. The Lincoln County Water District (LCWD) has proposed a groundwater development project to pump and transmit water from the Tule Desert and Clover Valley, and this project is being evaluated in the separate EIS. The Kane Springs Valley water development project also is proposed by the LCWD, but this project would draw upon hydrographic basins that are separate flow systems from the Tule Desert or Clover Valley.

Groundwater withdrawals could lead to the cumulative decline in groundwater levels and flows. Currently, there are 17,627 af/yr in permitted water rights in the Clover Valley, with 14,483 af/yr in pending water rights applications. In the Tule Desert, there are currently 4,345 af/yr in permitted water rights and about 42,000 af/yr in pending water rights applications (BLM 2007c). Water amounts to meet the needs of the No-Action or the Proposed Action alternatives are included within these figures. The perennial yield for each of these hydrographic areas is about 1,000 af/yr.

The Lower Meadow Valley Wash hydrographic area (with a perennial yield of about 5000 af/yr) has 92,467 af/yr in permitted water rights, with 20,909 af/yr in pending water rights applications. The Virgin River Valley hydrographic area has 30,260 in permitted water rights and 234,990 af/yr in pending water rights applications. Recharge to the Virgin River Valley is estimated to be about 3,600 af/yr, and the available perennial yield is estimated to be much higher, perhaps 40,000 af/yr, taking into account 12,000 af/yr in local pumping (Dixon and Katzer 2002).

An agreement between LCWD and the National Park Service stipulates that LCWD will monitor, manage, and mitigate unanticipated impacts that result from the development of groundwater resources in the Tule Desert area (BLM 2007c). Groundwater modeling is currently being conducted by the National Park Service to evaluate the regional flow systems and determine whether cumulative pumping in the regional area would influence spring flows in the Virgin River Basin.

4.18.3.9 Surface Water Resources

Floodplains

Floodplains provide floodwater storage during storm events. As the floodplains in the region are altered, their ability to provide floodwater storage capacity for the region will be diminished. All of the potential future developments in the region have the possibility to cumulatively impact floodplains in the region by either direct construction within the floodplains or by creating additional impervious surface areas that could increase the volume of water within the floodplains in the region. This may result in adverse impacts on the natural and beneficial floodplain values if alternate methods for the management of stormwater flows are not developed for each potential future development. However, the project area for all the alternatives is located in an area designated as Zone D on the Federal Emergency Management Agency foodplain maps. Flood hazards in Zone D areas are considered possible, but as of yet are undetermined, as an analysis of floodplains has not been conducted.

Jurisdictional Waters of the United States

Only the projects listed below possibly could have a cumulative impact on the potential jurisdictional waters contained within the project area. All projects described in Table 4-8 that are not listed below are not expected to cumulatively impact the potential jurisdictional waters contained within the project area.

- **Replacement Airport near Mesquite, Nevada**. Halfway Wash passes through the area under consideration for the replacement airport several miles downstream from the project area. Design for the airport has not been completed; however, it is likely that Halfway Wash would be spanned by either a culvert or a bridge. Therefore, the function and value of Halfway Wash will remain intact, and no cumulative impacts on potential jurisdictional waters within the project area are expected to occur as a result of the development of the replacement airport.
- **Exit 109 Interchange**. Cumulative impacts on the potential jurisdictional waters within the project area could occur from the development of the Exit 109 Interchange, dependent on the location and design of the exit. Halfway Wash may be impacted by the proposed interchange. However, because of the type of design required by the Nevada Department of Transportation, the function and values of Halfway Wash would remain intact, and no cumulative impacts on potential jurisdictional waters within the project area are expected to occur as a result of the development of the Exit 109 Interchange.
- **Virgin and Muddy Rivers Surface Water Development Project**. One of the proposed facilities for this project includes the Halfway Wash impoundment dam several miles downstream of the project area. This project is scheduled for completion no earlier than 2013; as such, no specific plans for the Halfway Wash impoundment dam have been completed. Impacts on Halfway Wash from this project will occur, but the degree to which Halfway Wash will be impacted is unknown at this time.

4.18.3.10 Biological Resources

BLM guidance (BLM 1994) recommends evaluating cumulative impacts on a watershed scale for natural resources related to watershed function and stability. Therefore, for purposes of analysis for biological resources, the cumulative impacts analysis area (CIAA) includes all watersheds that intersect the project area (Tule Desert, Virgin River Valley, and Lower Meadow Valley Wash basins) and are within the boundaries of the planning area for the BLM Ely District RMP. The CIAA includes approximately 1.5 million acres of land, which encompasses portions of four watersheds within southwestern Lincoln and northeastern Clark counties (see Map 4-1).

Analysis of existing levels of surface disturbance from available sources of geographic information system data was conducted at a gross scale (i.e., 1:100,000) for the CIAA. The analysis does not include detailed, finer-level data for surface disturbances such as individual homesteads, two track roads, or OHV use, and so provides a minimum estimate of the amount of direct disturbance associated with human activities within the CIAA. Based on this analysis, an estimated 13,178 acres of land within the CIAA (0.88 percent) have been disturbed or eliminated as a result of past and ongoing development activities. Table 4-12 summarizes the amount of existing disturbance by type (e.g., highway, urban development, agriculture, etc.) within each watershed.

Table 4-12
Area and Types of Disturbance by Watershed (Acres)

	Watershed				
Disturbance Type	**Lower Meadow Valley Wash**	**Lower Moapa Valley**	**Tule Desert**	**Virgin River Valley**	**Total Area of Disturbance**
Interstate	13.3	363.4	–	622.9	999.6
State highways	157.9	82.8	–	44.0	284.7
Other roads	621.5	286.1	371.7	1,052.4	2,331.7
Agriculture	822.3	1,910.9	–	1,756.6	4,489.8
Urban development	61.3	1,457.4	–	3,553.4	5,072.1
Subtotal	1,676.3	4,100.6	371.7	7,029.3	13,177.9

SOURCE: Bureau of Land Management 2006-2005; Environmental Systems Research Institute 2004; U.S. Geological Survey 2002

Future levels of potential surface disturbance could not be quantified in the same manner as the past and present disturbance, due to lack of specific area and location data. Where acreages and lengths were available for future projects, the numbers were included in the impact analysis.

Cumulative short- and long-term effects to biological resources within the CIAA are many and stem from a variety of activities, including oil and gas development; mining; livestock grazing; non-native and invasive species; OHV use; camping; agriculture; road, powerline, and pipeline construction; and commercial, residential, and recreational development. The region has several energy-generation plants and is crisscrossed by electric transmission lines and highways, as well as by water and natural gas pipelines, all of which serve urban areas in central and southern Nevada.

Vegetation

The extent of existing disturbance within the CIAA has reduced the total acreage of vegetation cover types by approximately 0.88 percent. Under the No-Action and Proposed Action alternatives, an estimated 963 and 1,661 acres of natural vegetation and habitat, respectively, would be modified or eliminated over the short term and long term. These figures include all temporary disturbance areas that would be reclaimed following construction (see Section 4.12). This represents a 0.06 and 0.1 percent reduction in vegetation cover types within the CIAA. Together with existing disturbances, this raises the cumulative total to 0.95 and 0.98 percent respectively under the No-Action and Proposed Action alternatives.

Potential future cumulative impacts include the direct loss of vegetation from development, changes in vegetation community composition due to increased noxious and invasive weed establishment and spread, increased numbers and intensities of wildfire due to increased fuel levels from weeds, as well as increased sources of ignition due to increased human presence in the area.

Future projects (refer to Table 4-8 for a list of future projects) would remove large areas of vegetation. Up to 153,340 acres of vegetation would be disturbed due to those planned or proposed projects shown on Map 4-1 whose areal extent is known. Additional areas of vegetation would be lost from other future projects whose areal extent is not known.

With regard to the Toquop Energy Project, because of the small proportions of vegetation cover types that would be disturbed and the reclamation reduction of post-construction disturbance from 56 to 65 percent, contributions to cumulative impacts on vegetation cover types from the project under all the alternatives would be expected to be minimal.

Noxious and Invasive Weeds

Noxious and invasive weeds are present throughout many portions of the CIAA, including most disturbed areas. The increase in surface disturbance (0.06 to 0.1 percent of the CIAA) and nitrogen deposition associated with the No-Action and Proposed Action alternatives would likely increase noxious and invasive weed establishment at disturbed sites. Ongoing nitrogen deposition from the Reid Gardner Power Plant may contribute to increases in the establishment and spread of noxious and invasive weeds. The establishment of noxious and invasive weeds at areas of disturbance potentially could facilitate their spread into adjacent habitats. Invasive grasses, such as red brome, are present throughout much of the proposed project area and are likely present throughout the CIAA. The spread of invasive grasses would increase fuel levels and the potential for increased intensity and numbers of wildfires within the CIAA. Wildfire within the CIAA potentially could lead to mortality of native plant species and transform the vegetation community from native vegetation to non-native grasslands. Future projects within the CIAA would further increase levels of surface disturbance, increase noxious and invasive weed establishment

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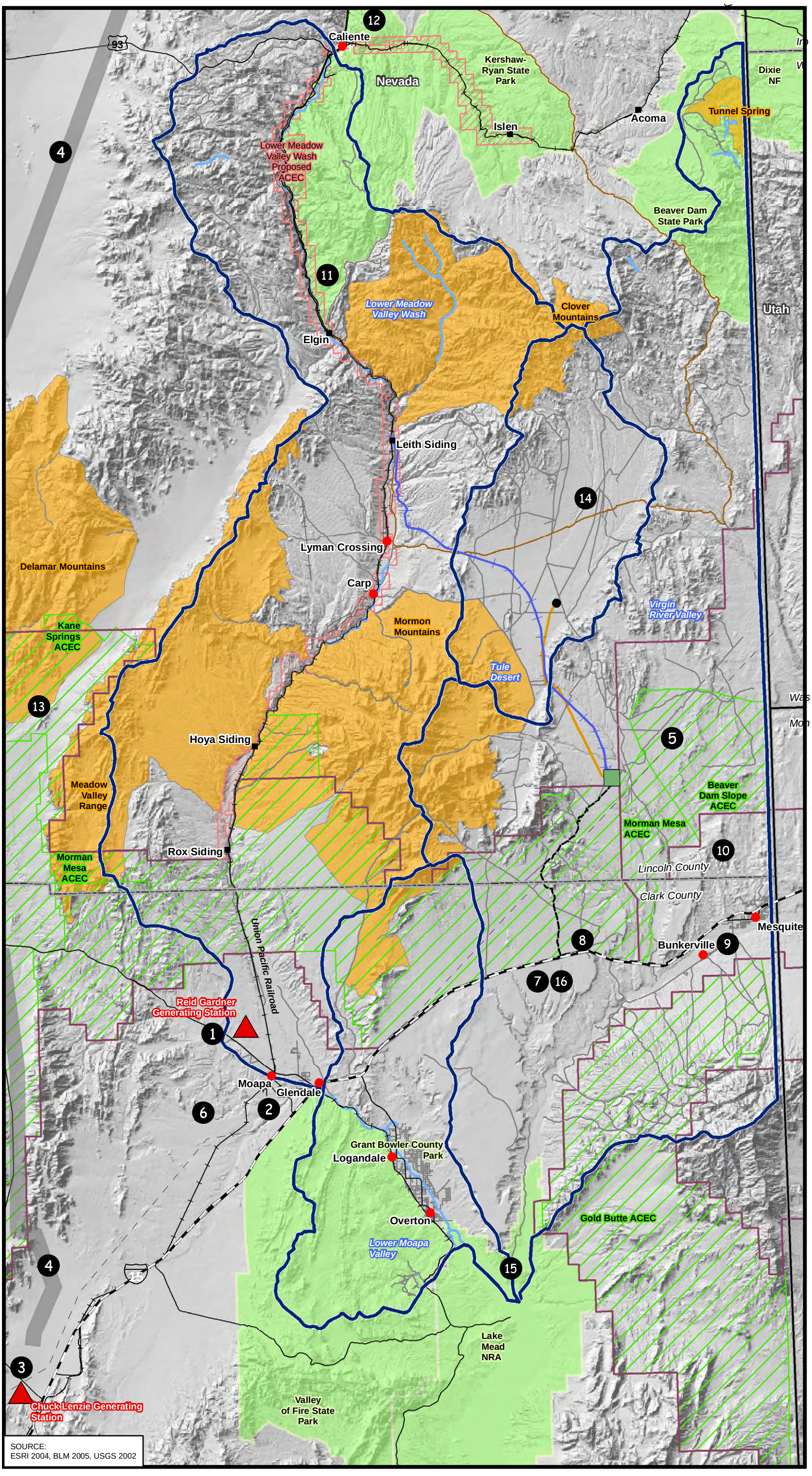
Cumulative Impact Analysis Area

Toquop Energy Project EIS
Lincoln County, Nevada



LEGEND

Special Featues and Designations

- Desert Tortoise Critical Habitat
- Wilderness
- Area of Critical Environmental Concern (ACEC)
- Proposed Lower Meadow Valley Wash Area of Critical Environmental Concern
- Recreation Area/State Park/ National Forest
- Backcountry By Way

Watershed Disturbance Features in Nevada

- Watershed Basin
- Perennial Streams
- Roads
- Generating Station

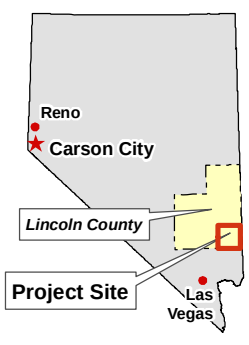
General Features

- Proposed Rail Line
- Proposed Plant Site (640 acres)
- Permitted Well Field
- Permitted Water Pipeline
- Permitted Access Road

1- Reid Gardner Station
2- Reid Gardner Expansion
3- Chuck Lenzie Generating Station
4- Southwest Intertie Project
5- Kern River Expansion Pipeline
6- Ash Grove Cement Plant
7- Mesquite Airport
8- Exit 109 Interchange
9- Wastewater Treatment Plant
10- Lincoln County Land Act
11- Proposed Meadow Valley Wash ACEC
12- Yucca Mountain Rail
13- Kane Springs Valley Water Development Project
14- Tule Desert Water Development Project
15- Virgin and Muddy Rivers Surface Water Development Project
16- Mesquite Contiguity Parcel

Reference Features

- Existing Road
- Interstate
- Existing Railroad
- County Boundary
- State Boundary
- Town
- Point of Interest



0 5 10
Miles

Map 4-1

and spread, and increase the numbers and intensities of wildfires. Mitigation measures, including monitoring for noxious and invasive weeds, control and eradication measures as outlined in an integrated pest management plan, and restoration of disturbed areas would limit the establishment and spread of weeds outside of the project area into the CIAA.

Wildlife

Wildlife habitat within the CIAA has been reduced by approximately 0.88 percent from existing disturbance. Under the No-Action and Proposed Action alternatives, respectively, an estimated 963 acres and 1,661 acres of habitat for general wildlife would be modified or eliminated over the short term to long term. This represents a 0.06 and 0.1 percent reduction in habitat for general wildlife within the CIAA. Together with existing disturbances, this raises the cumulative total to 0.94 and 0.98 percent respectively under the No-Action and Proposed Action alternatives.

Future projects (refer to Table 4-8) would lead to the further loss, degradation, and fragmentation of wildlife habitat within the CIAA. Tracts of habitat would be converted to industrial, residential, and other uses. Approximately 153,340 acres of wildlife habitat would be modified or eliminated (based on the projects on Map 4-1 for which areal extent is known). Acreage for other future projects whose area extent is currently unknown would lead to further modification or elimination of wildlife habitats. As wildlife habitats become further fragmented, some localized wildlife populations may become isolated, which potentially would decrease their ability to respond to environmental and other changes and stressors.

As described in Section 3.10.2.4, a maximum of 15,932 af/yr of groundwater use is currently permitted in the Tule Desert and Clover Valley, and applications to the State Engineer for 36,205 af/yr are pending at the time of this analysis. Future water development in the area may lead to the modification or elimination of some aquatic, riparian, and xeroriparian habitats from groundwater pumping and surface water diversion.

Because of the small proportions of general wildlife habitat that would be disturbed and the reclamation reduction of post-construction disturbance from 56 to 65 percent, contributions to cumulative impacts on general wildlife habitat from the Toquop Energy Project under all the alternatives is expected to be minimal.

Special Status Species

With regard to special status wildlife species, incremental effects from the construction of the proposed power plant and associated facilities would likely be greatest for the desert tortoise. Cumulative short- and long-term effects to desert tortoises within the CIAA are the same as those previously described for biological resources in general. Past, present, and future actions by the private sector, such as urbanization and the take of individual tortoises related to the indirect effects of urbanization, have resulted and will result in large-scale disturbances and degradation of habitat within the CIAA. Many cities and towns, including Moapa, Glendale, Mesquite, Bunkerville, and Carp, among others, are located in historic desert tortoise habitat. Urbanization is not only responsible for the direct reduction and fragmentation of desert tortoise habitat, but also increases the level of human access into adjacent tortoise habitat by virtue of an increase in the number of roads. Desert tortoises are often struck and killed by vehicles on roads and highways, and mortality of desert tortoises due to gunshot and OHV activities is common in many areas within the east Mojave Desert, particularly near cities and towns (USFWS 1994b).

Desert tortoise may be impacted by nitrogen and mercury deposition from existing coal-fired power plants such as the Reid Gardner Station. Impacts on tortoise from mercury deposition are currently unknown; however, the potential exists for adverse impacts if mercury concentrations in tortoises reach levels that decrease overall fitness. Nitrogen deposition may increase the establishment and spread of

noxious and invasive weeds, which can lead to direct loss of tortoise and changes in tortoise habitat due to increased fire intensities and frequencies and conversion of desertscrub to non-native grasslands.

Within the CIAA there are portions of three designated critical habitat areas for desert tortoise: Gold Butte-Pakoon (66,279 acres), Mormon Mesa (196,456 acres), and Beaver Dam Slope (87,750 acres). Together these areas comprise nearly 350,485 acres of habitat that is considered essential to the conservation of desert tortoises. Cumulative surface disturbances due to past activities in the CIAA have affected approximately 1,253 acres or 0.36 percent of this habitat. Projected surface disturbance under both the No-Action and Proposed Action alternatives would add approximately 42 acres of permanent disturbance to the total, and bring the cumulative disturbance within designated critical habitat for the desert tortoise within the CIAA to 1,295 acres or 0.37 percent.

Impacts on the desert tortoise associated with future projects include further loss or modification of approximately 134,760 acres and 40 miles along a utility corridor within historic desert tortoise habitat and increased human presence in habitats. Acreage for other future projects whose areal extent is currently unknown would increase the area of habitat modification and elimination. Desert tortoise habitat would be further fragmented by future development, which could lead to isolation of localized populations and potentially decrease the ability of these populations to respond to environmental and other changes and stressors.

Any potential adverse impacts on the desert tortoise under the No-Action Alternative would be mitigated by implementation of the specific terms and conditions issued in the July 23, 2003, Biological Opinion by the USFWS to reduce take of desert tortoises. Adoption of mitigation procedures described in Sections 4.12.1.2 and 4.12.2.2 would ensure that adverse impacts on the desert tortoise and other special status wildlife species under the Proposed Action Alternative are avoided. Thus, cumulative impacts on the desert tortoise resulting from either the No-Action Alternative or the Proposed Action Alternative are expected to be minimal.

4.18.3.11 Archaeology, Historic Preservation, and Indian Trust Assets

Cumulative impacts include the increased opportunity for human activity in the area that may include vandalism, theft, or unauthorized excavation of archaeological and historic sites. Mitigation would consist of continued visitation of members of the BLM Site Stewardship Program. Members of the Nevada Archaeological Site Stewardship Program are actively monitoring archaeological sites in the Mormon Mountains and Tule Desert area.

4.18.3.12 Socioeconomic Conditions

Socioeconomic conditions and the achievement of environmental justice in the local and regional areas of influence are vulnerable to incremental effects on employment, income, governmental revenue, and other social and economic characteristics.

Population

The local area of influence is composed of a very rural setting with small populations, with the exception of St. George, a community with a population of 64,201. Future employment opportunities are expected to add to population figures in the local area of influence. The remainder of the region of influence comprises three counties, two in Nevada and one in Utah. Each county has a minority and low-income population proportionately equal to its respective state. In Lincoln County, Nevada, increases in population are largely dependent on growing opportunities within the region. With housing developments and additional projects, it is anticipated that both the local and regional areas of influence will experience a substantial increase in population. Lincoln County is preparing for a possible population of 200,000 in

20 years. According to the Nevada Small Business Development Center's Web site, Clark County's population is expected to grow by 1,130,334 between 2003 and 2024.

Employment and Economy

The Toquop Energy Project is one of several similar actions in Nevada. The existing Reid Gardner Station and the Chuck Lenzie Generating Station are both owned by Nevada Power, which has a total of 1,772 employees (Nevada Power 2007). Future energy resource development is certain in the region. In addition to the Toquop Energy Project, there are two other large coal-fired generation plants proposed in Nevada—the White Pine Energy Station and the Ely Energy Center. White Pine Energy Station, owned by White Pine Energy Associates, LLC, is currently in the permitting process and is expected to be completed in 2010 in White Pine County. The total cost of the project is expected to be between $600 million and $1 billion, which would generate high revenue for the county from property taxes (Nevada Northern Railway News 2007). The Ely Energy Center would be located north of Ely, Nevada, and would be owned by Nevada Power, a Sierra Pacific Resources company. It has initiated the permitting process consisting of two phases with completion dates of 2011 and 2014. The Nevada State Department of Economic Development will be preparing a study to assess any direct and indirect impacts the project would have on state revenue, property and sales taxes, and other socioeconomic impacts (Sierra Pacific Resources 2007). Given expected increases in demand, it is certain that more employment opportunities will contribute to economic growth in both the local and regional area of influence.

Other projects listed in Table 4-8 would support the addition of more jobs and revenue to the state and affected counties, including the Tule Desert Water Development and Kane Springs Valley Water Development projects. It is unclear how much total revenue would be generated by these projects.

Housing

To accommodate future growth, numerous master-planned communities will be developed in the local area of influence, including the Riverside Planned Unit Development and the Mesquite Contiguity parcel in Mesquite, the Coyote Springs Development, and the Hidden Valley Community project. The Toquop Township also will include housing. Actual home values are unknown at this time.

Public Facilities and Services

Local Utility Service. The large and growing demand for electricity in the southwestern United States makes it certain that a variety of new and existing power generation technologies will meet that demand. Over the next 20 years, Federal energy policies will evolve and states will continue to set energy policy independently as well. It is anticipated that local utility companies, specifically those in Lincoln County, would have to expand their services to accommodate future growth in the region by buying supplemental power from larger energy facilities. Telecommunication companies also would have to accommodate that growth and have plans in place for expansion.

Education and Training. Given expected increases in population in both the Coyote Spring and Toquop areas, the school district is developing policies to accommodate that growth by adding new sites and facilities (Lincoln County 2006). Due to population projections for the remaining counties, there are policies in place to accommodate growth by creating new facilities including the expansion of roads and utilities to serve future development. For example, the city of St. George is working closely with the school district to identify and reserve lands for additional educational facilities (City of St. George 2002).

Health Conditions and Health Care. Currently, medical facilities within the local area of influence are anticipating growth from other projects and are currently developing plans to expand their services.

Public Safety. Given future residential development and increases in employment opportunities, local and state agencies will have to devise strategies to accommodate that growth in terms of infrastructure

and public safety. Projected needs for the Toquop area over the next 5 to 10 years include creating 6 patrol positions and 2.5 deputies per thousand individuals (Lincoln County 2006). Lincoln County also will provide fire department startup facilities specifically for the Toquop Township area. These facilities, including equipment and staffing, would be created through the developers' contributions.

4.19 UNAVOIDABLE ADVERSE IMPACTS, AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

This section summarizes the unavoidable adverse impacts, and irreversible and irretrievable commitments of resources that would be associated with each of the alternatives. An unavoidable adverse impact is a residual impact that would persist after the implementation of mitigation measures. An irreversible commitment of resources would occur if the resource commitment could not be changed after it is made. An irretrievable commitment of resources would occur if a resource would be used, consumed, destroyed, or degraded during the construction and operation of the project and it would not be able to be reused or recovered for some period of time. Table 4-13 characterizes types of impacts that would be anticipated for each alternative. This analysis is derived from the previous discussion.

4.20 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The purpose of this section is to highlight how short-term uses of the environment would affect the long-term productivity of resources. In this analysis, "short term" is defined as the period from the onset of construction activities through the initiation of project operation. "Long term" includes the period after decommissioning the power plant, which for all alternatives is expected to occur between 40 and 42 years after the project becomes operational.

The key short-term effects on the natural environment that would result under all alternatives would include the following:

- Soil disturbance would occur within the construction ROWs, which would result in increased erosion potential and increased potential for the spread of invasive species or noxious weeds.
- Disturbance of vegetation (which may provide habitat) would occur within construction ROWs.
- Stormwater runoff from the project facilities would change stormwater flow patterns and affect sediment transport

The surface area that would be temporarily affected (i.e., during construction) would vary among the alternatives. The No-Action Alternative would result in the temporary disturbance of about 963 acres. Under the Proposed Action Alternative, the size of the temporarily disturbed area would increase to 1,661 acres due to the addition of the rail line and the larger plant site footprint. Each of these short-term effects would be mitigated through the measures identified previously in this chapter. Mitigation measures would include minimizing surface disturbance, and reclamation of temporary ROW areas using best management practices identified in Appendix E. Ultimately, soil disturbance, vegetation loss, and stormwater impacts would be limited to permanent ROW areas, which would total about 199 acres under the No-Action Alternative and 930 acres under the Proposed Action Alternative.

The use of groundwater by each alternative would not result in a substantial decline in groundwater levels or a substantial depletion of ground water resources. Therefore, long-term productivity would not be influenced by the use of groundwater in the project under any alternative. However, the Proposed Action Alternative would have a lesser impact on groundwater systems than the No-Action Alternative, because the water requirements would be reduced to 2,500 af/yr from 7,000 af/yr.

Table 4-13
Unavoidable Adverse Impacts and Irreversible and Irretrievable Commitments of Resources

Resource or Resource Use	Unavoidable Adverse Impacts	Irreversible Impacts	Irretrievable Impacts (and Duration)
Land Use			
No-Action Alternative	None	None	None
Proposed Action Alternative	None	None	None
Grazing and Rangeland			
No-Action Alternative	12 acres of rangeland would be displaced.	None	Rangeland would be displaced for the life of the project.
Proposed Action Alternative	368 acres of rangeland would be displaced.	None	Rangeland would be displaced for the life of the project.
Recreation and Access			
No-Action Alternative	None	None	Dispersed recreational use would be displaced for the life of the project.
Proposed Action Alternative	None.	None	Dispersed recreational use would be displaced for the life of the project.
Wilderness and Special Designations			
No-Action Alternative	None	None	The improved access road would cross the Mormon Mesa Area of Critical Environmental Concern for the life of the project.
Proposed Action Alternative	None	None	The improved access road would cross the Mormon Mesa Area of Critical Environmental Concern for the life of the project.
Visual Resources			
No-Action Alternative	Components of the project would be visible to viewers in the Mormon Mountains Wilderness Area.	None	The introduction of project facilities would create a visual contrast with the existing natural environment for the life of the project.
Proposed Action Alternative	Components of the project would be visible to viewers in the Mormon Mountains Wilderness Area, Clover Mountains Wilderness Area, and two existing residences.	None	The introduction of project facilities would create a visual contrast with the existing natural environment for the life of the project.

Resource or Resource Use	Unavoidable Adverse Impacts	Irreversible Impacts	Irretrievable Impacts (and Duration)
Climate and Air Quality			
No-Action Alternative	Criteria pollutants would be emitted.	None	None
Proposed Action Alternative	Criteria pollutants would be emitted.	None	None
Noise			
No-Action Alternative	None	None	Noise levels would exceed ambient conditions occasionally for the life of the project.
Proposed Action Alternative	None	None	Noise levels would exceed ambient conditions occasionally for the life of the project.
Geology, Soils, and Minerals			
No-Action Alternative	Some biological soil crusts could be lost as a result of project construction.	None	Loss of biological soil crust would extend beyond the life of the project because these resources are extremely slow to form and probably cannot be artificially grown or maintained in a cost-effective manner.
Proposed Action Alternative	Some biological soil crusts could be lost as a result of project construction.	None	Loss of biological soil crust would extend beyond the life of the project because these resources are extremely slow to form and probably cannot be artificially grown or maintained in a cost-effective manner.
Groundwater Resources			
No-Action Alternative	Localized groundwater level declines would occur in the Tule Desert hydrographic region (power plant would require 7,000 acre feet per year).	Loss of groundwater would be considered irreversible because of the time required for replenishment of the aquifer.	Use of groundwater would be considered irretrievable because of the time required for replenishment of the aquifer.
Proposed Action Alternative	Localized groundwater level declines would occur in the Tule Desert hydrographic region, although they are fewer than the No-Action Alternative because less water would be required (2,500 acre feet per year).	Loss of groundwater would be considered irreversible because of the time required for replenishment of the aquifer.	Loss of groundwater would be considered irretrievable because of the time required for replenishment of the aquifer.
Surface Water Resources			
No-Action Alternative	None	None	None
Proposed Action Alternative	None	None	None

Resource or Resource Use	Unavoidable Adverse Impacts	Irreversible Impacts	Irretrievable Impacts (and Duration)
Biological Resources			
No-Action Alternative	Construction of the project would remove some vegetation (100 acres within the permanent footprint of the power plant). Long-term removal of vegetation due to access road improvements would total 65 acres.	None	Vegetation would be displaced by project facilities for the life of the project.
Proposed Action Alternative	Construction of the project would remove some vegetation (831 acres within permanent ROWs for the power plant footprint and the rail line). The access road improvements would be the same as for the No-Action Alternative. A small amount of mercury emissions would deposit in the area.	None	Vegetation would be displaced by project facilities for the life of the project.
Archaeology and Historic Preservation			
No-Action Alternative	Possible indirect effects on resources could result from increased public access to the area.	If resources were inadvertently or indirectly destroyed during project construction, the damage would be irreversible. However, the Programmatic Agreement would mitigate impacts.	If resources were inadvertently destroyed during project construction or indirectly, the damage would be irretrievable. However, the Programmatic Agreement would mitigate impacts.
Proposed Action Alternative	Possible indirect effects on resources could result from increased public access to the area.	If resources were inadvertently or indirectly destroyed during project construction, the damage would be irreversible. However, the Programmatic Agreement would mitigate impacts.	If resources were inadvertently or indirectly destroyed during project construction, the damage would be irretrievable. However, the Programmatic Agreement would mitigate impacts.
Paleontological Resources			
No-Action Alternative	None	None	None
Proposed Action Alternative	None	None	None
Public Safety, Hazardous Materials, and Public Safety			
No-Action Alternative	None	None	None
Proposed Action Alternative	None	None	None

Resource or Resource Use	Unavoidable Adverse Impacts	Irreversible Impacts	Irretrievable Impacts (and Duration)
Socioeconomic Resources			
No-Action Alternative	None	None	Regional and local employment and revenues would increase for the life of the project.
Proposed Action Alternative	None	None	Regional and local employment and revenues would increase for the life of the project.

Long-term productivity of most soil and vegetation resources would not be compromised by the project under any alternative, because of the reclamation that would occur after construction and after decommissioning of the power plant. However, any disturbance to biological soil crusts would have a long-term impact, since these resources are slow to regenerate. Impacts on critical habitat for the desert tortoise would be mitigated under the No-Action Alternative and the Proposed Action Alternative.

Under all alternatives, short- and long-term socioeconomic impacts include the generation of tax revenue, employment, and induced employment as a result of wage and other expenditures. The contribution that the project would make to power supply would support long-term economic development in the local area and the region.

4.21 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Energy requirements under all alternatives would include the use of the following resources:

- Petroleum products (diesel, gasoline, oil and grease)
- Chemical products (anhydrous ammonia for the Proposed Action Alternative)
- Natural resources (native aggregate from borrow areas, water from the Tule Desert well field, natural gas from the Kern River Gas pipeline, and coal from Wyoming's Powder River Basin)
- Other building, operations and maintenance materials (steel, aluminum, and wood)

There would be a similar amount of energy and resources required to construct, operate and maintain either the Proposed Action Alternative or the No-Action Alternative.

Conservation potential under the Proposed Action Alternative would be greater with regard to groundwater resources, as this alternative would require less than 2,500 af/yr, whereas the No-Action Alternative would require nearly 7,000 af/yr.

4.22 MONITORING

A groundwater monitoring program plan would be developed as part of the well field design. This plan, which would incorporate the monitoring components of the agreement between Lincoln County, Vidler Water Company, and the National Park Service, would assess changes in water levels downgradient of the production wells. The purpose of the plan is to identify the extent of any cones of depression that could develop as a result from operation of the production wells. The Tule Desert well also would be monitored in order to assess any changes to groundwater levels. Any substantial decline in groundwater level in the Tule Desert downgradient of the production well field would be assessed, particularly with respect to groundwater conditions in the Virgin River Valley.

At least one monitoring well would be installed south of the southernmost production well. The amount of disturbed area associated with this well would be approximately 1 acre. Groundwater monitoring also would occur within the well field, with monitoring wells installed within the appropriate vicinity of the production wells to assess trends in water level change. The areas of disturbance associated with monitoring wells would not add to the total area of disturbed land accounted for in assessing the number and location of the production wells, as these areas are included within production well field area calculations.

Fencing for tortoise protection along the rail line would be monitored to ensure it is not crushed by grazing cattle or other activities.

Monitoring of surface water resources would occur as identified in the stormwater management plan.

Survey and monitoring of desert tortoise habitat would occur during construction activities as identified in Section 4.12.2.2 and any subsequent direction from the USFWS.

Monitoring of potential impacts on archaeological and historic resources during construction would occur in accordance with the Programmatic Agreement between the BLM and the State Historic Preservation Office.

Monitoring for noxious and invasive weeds would take place around the plant site, rail line, and project features.

Monitoring for bird mortality would occur at the base of the towers and stack.